GOVERNMENT OF INDIA

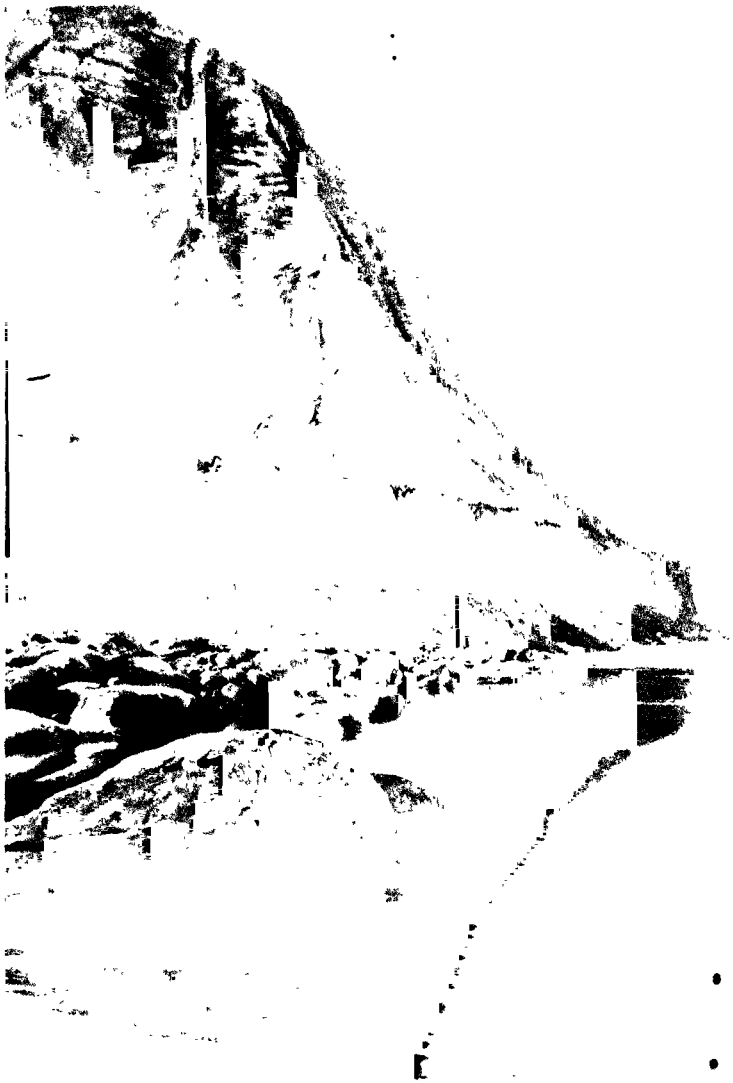
DEPARTMENT OF ARCHAEOLOGY

CENTRAL ARCHAEOLOGICAL LIBRARY

CALL NO. 910.4095 DeF

D.G A. 79.

HIMALAYA, KARAKORAM
AND
EASTERN TURKESTAN



R. W. SPRANGER PINX

FROM A NEG. OF J. A. SPRANGER

Shayok Valley above the confluence of the Chang Chenmo

COPYRIGHT

TRANSLATED BY H. T. LOWE-PORTER FROM THE ITALIAN EDITION
AS REVISED BY THE AUTHOR, WITH AN ADDITIONAL CHAPTER ON THE SCIENTIFIC RESULTS

CENTRAL ARCHAEOLOGICAL
LIBRARY, NEW DELHI.
Acc. No. 33692
Date. 1-5-58
Call No. 910.4095
Def.

MADE AND PRINTED IN GREAT BRITAIN BY BUTLER AND TANNER LTD., FROME AND LONDON

PREFACE

THIS book contains an account of the expedition conducted by me across India, Baltistan, Ladak and Russian Turkestan between August 1913 and December 1914. It was first published in Italy eight years ago.[1] Despite the long interval of time I hope that the results reached may justify its re-issue in English.

The preparation of this new edition has enabled me not only to make a careful revision of the text [2] but also to refer to the expeditions which have taken place since the book was written.

The scientific results which we achieved are being separately published in two series of volumes, containing the narratives and personal recollections of the members of the expedition, as well as monographs by other scientists in special fields, the whole embodying all the documentary material brought back by the expedition.

The study of the scientific material has now progressed far enough to permit of my adding a new chapter to this edition, in which are summed up the general results of the expedition in the various fields of research.[3]

It gives me great pleasure to express here my gratitude to Professor Giotto Dainelli and Mr. J. A. Spranger, for consenting to complete the present record by chapters describing the country they covered with separate caravans: Dainelli alone and with Professor Olinto Marinelli; Spranger with Major (now Colonel) H. Wood of the Indian Trigonometrical Survey.

[1] F. De Filippi, *Storia della Spedizione Scientifica Italiana nel Himàlaia, Caracorùm e Turchestan Cinese* (1913–14); Bologna, 1923.

[2] It should be said that the spelling of geographical names throughout the book has been made to conform to that of the Indian Atlas, slightly modified in accordance with the rules since adopted by the Survey of India and the Royal Geographical Society.

[3] *Relazioni Scientifiche della Spedizione De Filippi nell'Himàlaia, Caracorùm e Turchestan Cinese* (1913–14). *Serie Prima, con una Introduzione di F. De Filippi: Vols. I–III, Geodesia e Geofisica: Relazioni di A. Alessio, G. Abetti, G. A. Spranger, C. Alessandri e N. Venturi Ginori. Serie Seconda, sotto la Direzione Scientifica ed editoriale di G. Dainelli: Vols. I–X, Introduzione di G. Dainelli, Geologia Glaciale, Geografia Fisica e Storia Geologica della Regione, Antropogeografia: Relazioni di G. Dainelli e O. Marinelli; Litologia, Paleontologia, Antropologia, Flora e Fauna, da vari contributori.* Bologna, Nicola Zanichelli. Nine volumes have been published, the rest are in preparation.

In the course of my narrative I shall have occasion to mention the many other people to whom the expedition was especially indebted for direct or indirect assistance. Indeed, it could not have been carried out at all without constant co-operation from those who had at various times the means or power to be of service to us. For this was, in certain respects, a novel enterprise. I do not know if any other trans-continental expedition has ever been organized through such difficult regions, crossing vast desert tracts devoid of sustenance for man or beast; with so extensive and complex a programme of scientific research, requiring not only a considerable company of trained workers but also a very cumbersome equipment, including quantities of the most delicate instruments, which had to be transported with infinite precautions and needed unremitting care and supervision.

The organization of the expedition was still further complicated by the diversity of our programme of research and the time-limits within which we had to complete it; these made it necessary to form groups of workers independent of the main body, with caravans equipped to make excursions and explorations outside of the regular itinerary.

The rather special character of the expedition in these respects may, I hope, warrant me in giving a rather more detailed account of the organization than is usual in such narratives; it may be of interest to the reader and possibly helpful to those considering a like enterprise. On the other hand, I shall be brief in that part of my tale which covers the same ground as the expedition of His Royal Highness the Duke of the Abruzzi to the Baltoro Glacier in 1909, as already described by me.

I cannot close these few introductory paragraphs without a reference to Olinto Marinelli, a dear and lamented friend whose death, on the 14th of June 1926, deprived Italy of one of her most active and able geographers. I shall never cease to be grateful for all the precious time and knowledge which he unstintingly bestowed upon our expedition.

Nor can I fail to speak of two other departed members who served the expedition with devotion and loyalty: Giuseppe Petigax, who in many fields had earned the gratitude of explorers—in America, Africa, Asia and the Arctic—and Ghulam Rasul Galwan, the ablest, most upright and companionable *caravan bashi* that ever was.

FILIPPO DE FILIPPI.

Settignano, Florence,
December, 1931.

CONTENTS

CHAP.		PAGE
I	ORIGIN AND AIMS OF THE EXPEDITION; PREPARATION AND GENERAL ORGANIZATION	1
II	FROM ITALY TO BALTISTAN	11
III	WINTER IN SKARDU, THE CAPITAL OF BALTISTAN	37
IV	WINTER EXCURSIONS IN BALTISTAN. By GIOTTO DAINELLI	74
V	FROM SKARDU TO LEH	100
VI	LEH	163
VII	BETWEEN BALTISTAN AND LADAK. By GIOTTO DAINELLI	228
VIII	EXCURSIONS IN LADAK. By GIOTTO DAINELLI	251
IX	FROM LEH TO THE DEPSANG PLATEAU	275
X	THE DEPSANG PLATEAU	307
XI	THE RIMU GLACIER	317
XII	LINGZI-THANG, THE SHAYOK GLACIERS, RIMU GLACIER AND THE SOURCE OF THE YARKAND RIVER. By GIOTTO DAINELLI	350
XIII	THE WATERSHED BETWEEN THE RIMU GLACIER AND THE KARAKORAM PASS. THE SOURCES OF THE YARKAND RIVER. By J. A. SPRANGER	370
XIV	TOPOGRAPHY OF THE RIMU GLACIER AND OF THE SOURCE-BASINS OF THE SHAYOK AND YARKAND RIVERS	393
XV	THE KARAKORAM, SUGET AND KOKART PASSES. THE RASKAM DARIA OR UPPER YARKAND RIVER.	408
XVI	FROM SURKOWAT TO KASHGAR; EASTERN TURKESTAN	450
XVII	CHINESE AND RUSSIAN TURKESTAN	486
XVIII	SYNOPSIS OF RESULTS	502
	BIBLIOGRAPHICAL INDEX OF WORKS QUOTED	509
	GENERAL INDEX	517

LIST OF ILLUSTRATIONS

COLOURED PLATES

(From paintings by R. W. SPRANGER)

Shayok Valley above the confluence of the Chang-Chenmo . . . . *Frontispiece*
Hayward Lake in the Upper Yarkand Valley . . . . . *Facing page* 372

PANORAMAS

The Oasis of Skardu . . . . . *Facing page* 46
Balti Fortress on the rock of Skardu . . . . . „ 48
Lamayuru . . . . . „ 142
Leh . . . . . „ 170
Wall painting in a temple of the Himis Monastery . . . . . „ 222
Camp on the Depsang Plateau (17,600 feet) . . . . . „ 310
Surkovat Valley and Aghil Range from a ridge above the Raskam Daria . . „ 444
Left side of the front of the Rimu glacier . . . . . *In end pocket*
Col at the head of the Northern Rimu . . . . . „
Range to the right of the Northern Rimu, dividing it from the main Rimu glacier „
Third camp on the Rimu, at the junction of the northern branch with the main branch „
Panorama A. From a station on the dividing spur between the main glacier and the Southern Rimu (16,690 feet) looking east . . . . . „
Panorama B. (*Circular*). From the centre of the great curve of the main trunk of the Rimu glacier (17,600 feet) . . . . . „
Panorama C. The upper Rimu from a spur on the left (northern) side of the glacier (18,960 feet) a little below the upper basin . . . . . „
Panorama D. From a station above the angle of bifurcation of the Northern Rimu „

COLOURED MAPS

Oro-hydrographical sketches of the Eastern Karakoram, (*a*) from the Indian Survey map (1892), (*b*) from the surveys of the De Filippi Expedition (1913–14)
Between pages 392 *and* 393
Itineraries of the De Filippi Expedition (1913–14) . . . . . *In end pocket*
The Depsang Plains and upper basins of the Yarkand and Shayok Rivers . . „

ILLUSTRATIONS IN TEXT

	PAGE
Camp at Sonamarg, in the Sind valley	20
The Zoji-la (11,570 feet), from the west	21
Metchuhoi Glacier, Gumber valley	22
Inhabitants of Dras	23
Ruined fort of Dras	24
Buddhist monuments near Dras	26
The Suru-Dras valley above Olting	27
The old castle of Karmang	29
Jula bridge over the Indus at Karmang	30
The eldest son of the Rajah of Karmang	31
The Indus at Tolti	32
The Rajah of Tolti with his son and suite	33
Parkutta	35
The Skardu basin	38
View toward the north from Pindobal terrace in the valley of the Burji-la	41
The Rock of Skardu	46
Mosque inside the fort of Skardu	47
Autumn in the oasis of Skardu	50
Group of Brokpas (Dards) at Skardu	52
Balti music and dancing at Skardu	54
Lake Satpor from its lower end	58
Dike, Lake Satpor	59
Remains of fortifications on the east side of the lake	60
Kuardo, with the Rajah's Palace	61
Sacred tomb near Kuardo	62
Shigar valley and oasis, from the valley behind it	63
The Grand Mosque, Shigar	64
Gallery on the south side of the Grand Mosque	65
Two-storeyed mosque, Shigar	67
Mosque, Shigar	68
Archers at Shigar	69
Mount Marshalang (20,500 feet) in the Skardu basin	71
Balti types	74
The monastery of Eishmakan, in the Lidar valley	75
Terraced fields in the oasis of Tolti	78
Natives of Tolti, bearing gifts	79
The Rock of Skardu, with clay terrace	80
Balti wedding at Skardu	82
Balti women in the plain of Skardu	82
Leaving for the high valleys of the Karakoram	84
Balti house	85
Hot spring at Chutrun	88
Snow in the Basha valley	89
The lower Shayok valley	91

PAGE

Ancient mosque at Khapalu 93
The best road, Shayok valley 94
Winter pastures, Shayok valley 96
The Sherpigang glacier, Kondus valley 98
Winter in the Indus valley, below Parkutta 101
Path along the Indus near Tolti 102
Loggia with pierced screens in the castle of Karmang 104
Lamaic pantheon in the temple of the fast at Tikse 107
Tantric deity in the monastery of Himis 109
Tantric deity, Himis 110
Group of *Chumos* 112
Monastery of Phayang 113
Group of *chortens* at the entrance to the Himis valley 115
Chorten with bas-reliefs at Lamayuru 116
Chorten with doorway, Lamayuru 117
Mani wall near Lamayuru 118
Lhato near Tikse 119
Prayer-wheels in the temple porch, monastery of Likir 121
Great Prayer-wheel in the monastery of Tikse 122
Colossal seated statue of Chamba in the Red Chapel of the Namgyal Tsemo, Leh . . 124
Mural paintings of Tantric divinities in the lower chapel on Namgyal Tsemo, Leh . . 126
The *Kushok's* private chapel, in the monastery of Sankar, near Leh 127
Tankas in the *Kushok's* apartment in the monastery of Himis 128
Musicians in the monastery of Likir 129
The library, Tikse 130
A sacred book 131
Lama reading a volume of the *Kahgyur*, in the monastery of Tikse 132
Tibetan musical notation: fragment of a Book of Songs (Yang Jig) 133
Chortens and *mani* wall on the way to the Fotu-la 139
A turn in the valley above Lamayuru 140
Lamayuru 141
A balcony in the monastery of Lamayuru 142
Entrance to the gorges below Lamayuru 144
The bridge at Kalatse 145
Colossal statue of Chamba (Maitreia) in the monastery of Temesgam 147
Crowd of worshippers at the temple of Temesgam 148
The Monastery of Rigzon 149
The Abbot and Monks of Rigzon (yellow sect) 150
Prayer-wheels operated by the wind 151
Alchi 152
The principal temple of Alchi 153
Ladaki women in gala attire 155
The Monastery of Likir 157
Bazgo 158
Ruins between Bazgo and Nimu 159
Dance of masked monks in the monastery of Phayang 160

PAGE

Chinese costumes in the mystery play at Phayang 161
The geophysical caravan 168
The bazaar at Leh 170
Ladaki women dancing 172
Dancers in costume 173
Spiti dancers 174
Troupe of dancers from Lhasa 175
Monastery band at Leh 176
Sodnam, the former King of Ladak, in ceremonial robes for the New Year . . . 180
The royal palace at Stok 181
Altar in the palace chapel of Stok 182
Kushok Bakula and the treasurer (*chagzot*) of the monastery of Spituk 184
The monastery of Spituk 185
Painting of the Wheel of Life in the monastery of Spituk 186
The present King of Ladak, with *Kushok* Raspa and his suite 188
Entrance to the monastery of Sankar 189
The hermit of Leh 192
Making tea for the celebrants 194
The Namgyal Tsemo, with the ruined palace and the two temples 195
Frescoes on the east wall of the lower chapel 196
Frescoes on the south wall of the lower chapel 198
Fresco in the royal palace on the Namgyal Tsemo 199
Sgomang *chorten* at Chubi near Leh 200
Trashi Teu *chorten*, near Leh 202
Mussulman cemetery near Leh 203
The castle ruins and the monastery, Sheh 204
Statue of Chamba (Maitreia) and sacred vessels, in the temple, Sheh 206
Chorten at Sheh 207
The monastery of Tikse 208
The principal temple, Tikse 209
The *Kushok's* private chapel, in the monastery of Tikse 210
In the *Kushok's* private chapel, Tikse 211
The monastery of Chimre 212
The monastery of Himis 213
Costume and masks in the mystery plays 214
Statue of Stagtsang Raspa, founder of the monastery of Himis (red sect) 215
Statue of Tsepagmed, in the large temple of Himis 217
Tanka in the *Kushok's* apartments, Himis 218
Frescoes in one of the temples, Himis 219
Reception hall, Himis 220
The *Chagzot* (treasurer) of Himis 221
Ploughing in Ladak 224
Large species of sheep, Ladak and Tibet 225
Dwarf goat of Purig and large goat of Ladak 225
The *kyang* of Ladak and Tibet 226
A Brokpa 228

PAGE

Dards of the Indus 230
Dard houses at Dah 232
The old castle of Dah 233
In the Chiktan valley 234
Houses at Shakar 235
On the roofs at Shakar 236
Lumsu 237
On the Kurit-la 238
The old *gonpa* of Izgang 240
The castle of Chiktan 243
Gonpa and *chorten* at Shargol 246
Ascending the Namika-la 247
One of the temples of Temesgam 248
The *gonpa* of Phayang 249
A Ladaki 251
Mosque, and corner of the bazaar, Leh; above, the old royal palace 252
Yak caravan in the Rong valley 257
In the Rong valley 258
The upper Indus near Chumathang 259
The frozen surface of the Tso Moriri 261
The *gonpa* of Garzok 262
A *rebo*, or Changpa tent 263
Changpa shepherds near the Tsaka-la 265
Crossing the Tsaka-la 266
On the banks of the frozen Pangkong 268
In the monastery of Himis 270
Farmer's house, Shushot 271
Returning to Leh, with the *Kushok* of Himis 272
Apricot-trees in blossom at Chiling in the Zanskar valley 274
The Kardong-la from the north 276
The glaciers of the Sassir-la 276
Entrance to the valley of the Chang-la, near Sakti 281
Camp at Zingrul 282
Camp at Shayok 283
Requisitioning horses at Shayok 284
Enrolling porters at Shayok 285
The big bend, Shayok river 286
Camp at Tol Depsa, Shayok valley 287
Side walls of the Shayok valley, below the confluence of the Chang Chenmo . . . 288
Right wall of the Shayok valley near the junction of the Chang Chenmo 288
Mountains of the Shayok valley, from the morainic terrace near Shukpa 289
Bridge over the Chang Chenmo. 290
Mountains of the Chang Chenmo, from the Shayok valley above the confluence . . . 290
Looking down the Shayok valley, between Shukpa and Nya Yakmic 291
Camp kitchen, Shayok 292
Ruined fort at Yurgolok 293

PAGE

Camp at Salakpa, Shayok valley 294
Central portion of the Nubra-Shayok watershed 295
Gorges below Murgo 296
Murgo Camp 298
Tributary valley west of Murgo, with the road to Sassir 299
Limestone range above Murgo 300
A tributary valley of the Murgo, with glaciers 302
Camp at Burtze Yokma 303
Camp at Kisil Lungur 305
Peak 22,750 and mountains south-west of Depsang plateau 309
Arenaria polytricoides, Depsang plateau 310
Pilgrims on their way to Mecca 311
Stormy sky on the Depsang 314
Front and southern branch of the Rimu glacier, from the western edge of the Depsang . 319
Fording the Chipchap 323
Ice pyramids and marginal lake in the lower part of the Rimu 325
Results of melting and erosion in the lower part of the Rimu 326
Right-hand marginal moraine and morainic cone near our first camp 329
The fourth tributary glacier on the right side of the Rimu 331
Marginal moraine on the right side of the lower Rimu 332
Our second camp on the right-hand marginal moraine 333
Telephotograph of Depsang peak (22,750) from the central amphitheatre of the Rimu . . 334
Chain on the left side of the upper Rimu 335
Offshoot of the northern branch of the Rimu, the source of the Yarkand river . . . 337
The first left-hand tributary of the Yarkand, near its source 338
Porters arriving at our camp on the left-hand edge of the northern branch 339
Marginal lake below the upper circus of the Rimu 340
Upper circus of the Rimu glacier from a point between Camps VI and VII . . . 342
Saddle leading to the Siachen glacier 343
Our camp in the upper circus of the Rimu 344
Southern branch of the Rimu, left-hand side 348
Changpas 350
Changpa houses, Shayok village 351
Small valley going up from Kisil Lungur to the Depsang 353
My caravan men, from Temesgam 355
The frozen Kara-Kash 357
Fantastic shapes in the upper basin of the Kara-Kash 358
Limestone spires among the schists of the upper Kara-Kash 359
Our highest camp, between the Kara-Kash valley and the Lingzi-Thang plateau . . . 361
Resting in a valley among the plateaux of Tibet 362
Coolies' tents, Taldat plain 363
Front of the Great Kumdan, shutting off the course of the Shayok 365
Peaks and pyramids, the result of erosion in the tongue of the Great Ak-Tash . . . 366
On the Rimu 367
Camp IV on the Rimu 368
The Gurkhas (from Nepal) 370

PAGE

Pass and valley north-west of the Karakoram Pass, leading to the Yarkand valley . . 371
The Yarkand valley, at the mouth of the tributary coming down to the north-west of the Karakoram Pass 372
Glaciers covering the right side of the first tributary on the west of the Yarkand valley . 374
Large valley west of the saddle, lying at the head of the first western tributary of the Yarkand (Shaksgam valley) 375
Front of the offshoot of the northern branch of the Rimu, source of the Yarkand river . 376
Rocky gorge in a small tributary valley of the Chipchap, which descends from Peak 19,920 of the watershed range 380
Snowy summit at the head of a valley tributary to the Chipchap, where we made Station 19,920 on August 7th 381
Darwaz Sarikot, between Baksum Bulak and Ak-Tagh 382
Camp at Kufelang 383
From a station above Ak-Tagh, looking westward 384
In the second western tributary of the Yarkand valley 385
Glacier coming down from the right side of the second western tributary of the Yarkand valley . 386
The higher of the two glaciers which obstruct the second western tributary of the Yarkand valley 387
Circle of glaciers at the head of the second western tributary of the Yarkand valley . . 389
Between the gorges of the third western tributary 390
The Yarkand valley from Station 18,510, on the north side of the third western tributary (looking north) 391
Dainelli's caravan on the "Italia Col," August 15, 1930 400
Comparative sketch-maps of the upper basins of the Rimu and Tarim Sher glaciers (scale 1″ = 4 miles), from the Indian Trigonometrical Survey map, Sheet 52E, 1928, and from Dainelli's Survey, 1930 401
Group of Kirghiz in camp 411
Bactrian camel 413
Pulo 414
Camp at Chajos Jilgha on the way to the Karakoram 415
Climbing up to the Karakoram; on the southern side, a little below the pass . . . 416
On the Karakoram pass, looking south-east 418
On the Karakoram pass, looking west 419
The caravan leaving Baksum-Bulak 420
Camp at Chibra, at the foot of the Suget Dawan 422
Looking north from the Suget Dawan 423
Suget Karaul 424
The Chinese official and a group of Kirghiz, at Suget Karaul 426
An *akoi*, with Kirghiz women 427
Kirghiz group at Jai Konma 429
Interior of *akoi*, and Kirghiz family 431
Kirghiz delegation at Kirghiz Jangal 433
Alluvial terraces in the valley of the Raskam Daria (upper Yarkand) 436
Looking north-west from the Yangi Dawan 437
The Sorok Jilga, north of the Yangi Dawan 438
The Turaghil valley 438
The Raskam Daria below Chirak Saldi 439

PAGE

Urdek Saldi 440
The Raskam Daria above Bazar Dara. 441
Arrival of the caravan at Bazar Dara 442
Our mounts between Bazar Dara and Surkowat 443
The Raskam Daria at the junction of Bazar Dara 444
Our camp on the right bank of the Raskam Daria, opposite the Surkowat 446
The Surkowat flowing into the Raskam Daria 447
Approach to the Kukalan Dawan 452
Marble peaks north of the Kukalan Dawan 453
Otmal Yagash, an *aghil* of the Pakpu tribe, in the upper basin of the Tiznaf . . . 455
Group of Pakpus 456
Maẓar (tomb of a saint) at Dudma Tag 457
Upper Tiznaf valley 459
The *serai*, Ak-Masjid 460
Besh Terek 462
Street in the Bazaar, Karghalik 465
Paper factory, Karghalik 466
The Grand Mosque, Karghalik 467
A *mafa* 469
A *fotai*, or milestone, in Chinese Turkestan 471
Ferrying across the Yarkand river 472
Wall of the Yangi Shahr, Yarkand 473
Gate at the Yangi Shahr 474
Criminals in the stocks 476
Plan of the city of Yarkand 477
The *Amban* of Yarkand on his way to visit us 479
Road between Yarkand and Kök Robat 480
Ak Robat 481
Kisil Bazar 482
Bridge over the Saigan 483
On the road between Yangi Hissar and Yapchen 484
Plan of the city of Kashgar 487
Bazaar Street, Kashgar 488
Ghulam Rasul Galwan, *aksakal* of Leh 495
Kirghiz on the march, above Irkistan 498
Sufi Kurgan, in the Gulcha valley 499
Observatory and geodetic station, Tashkent 500

HIMALAYA, KARAKORAM AND EASTERN TURKESTAN

CHAPTER I

ORIGIN AND AIMS OF THE EXPEDITION; PREPARATION AND GENERAL ORGANIZATION

Plan of research: geophysics, geodesy, geographical exploration—Personnel—Equipment: scientific instruments, camping outfit, food supplies—Transportation.

IT was while preparing for publication the account of the expedition conducted by the Duke of the Abruzzi to the Baltoro glacier and the Karakoram in 1909, that I conceived the idea of a scientific expedition in the region between Western India and Central Asia, which is crossed by the mountain ranges of the Himalayas, the Karakoram and the Kuen Lun. The study which I made at that time of the bibliography of the region convinced me of the variety and importance of the unsolved problems it presented and of its fruitfulness as a field for research.

Notwithstanding that the whole region has been explored almost in its entirety and crossed in every direction by many travellers since the beginning of the last century, not one of its major geographical problems had been

satisfactorily investigated.[1] Its geology, glaciology and morphology were all hypothesis and contradictory theories. In default of systematic geological exploration, it was not possible to make any rational classification of the colossal mountain ranges which cover it. Nor was there greater agreement upon the races of men inhabiting it. As for geophysics, only the meteorology had been the subject of systematic observations, in the few scattered observatories of Kashmir, Baltistan and Ladak; and even here a wide field for researches remained.

But the subject which from the first drew me more than any other was the measurement of gravity. I will not go into technical detail, since the subject is dealt with in the reports by competent scientists. Suffice it to say that gravimetrical observations have been made the basis of approach to the study of problems connected with the formation of the Himalayas, and in general to the question of the distribution of terrestrial masses, with results that have given rise to much valuable discussion. The theory of isostasy—i.e. the theory of the equilibrium between the heterogeneous masses of varying densities constituting the crust of the earth—and the hypotheses of the formation of mountain chains, bound up as they are with two opposed conceptions, of the elasticity and the rigidity of the earth's crust, have been brought up anew and re-discussed in the light of new factors and new criteria.

Thus there could be no doubt of the importance and the utility of gravimetric measurements and observations of deviations from the vertical, when expertly carried out in the heart of the massifs of the Himalayas and the Karakoram, where the great altitude and the various practical difficulties had combined up till now to prevent the making of such delicate observations.

As for terrestrial magnetism, it had never been the subject of systematic observations in the mountain barrier between India and Central Asia.

There was also the further incentive of the exploration of the eastern end of the Karakoram and its unknown glaciers. It was toward this region that our expedition was to bend its steps. With this preamble, and with the aid of the general map included in the present volume, it should not be hard for the reader to understand the objects of the expedition and the ideas which underlay our programme of research as it finally took shape.

The extraordinary rampart of mountains which goes under the name of the Himalaya—"the abode of snow"—extends for over 1,500 miles on the northern border of India between Afghanistan and Burma, with its axis decidedly inclined from north-west to south-east. It girds like a colossal sustaining bastion the high plateau of Tibet, of which it forms the southern boundary; and at the south-western corner of this plateau, where lie the provinces of Kumaon and Garhwal, it frays out into a tuft of mountain chains running north-west to meet two other systems going in the opposite

[1] In *Karakoram and Western Himalaya*, London, 1912, I have mentioned the chief problems discussed and the divergent views of explorers upon this region.

direction, the Karakoram and the Kuen Lun. This most intricate labyrinth of mountains, stretching for a width of some 375 miles between the Indian and the Central Asian plains, is diagonally crossed by the high valley of the Indus, and cut into by the courses of its tributary streams, which are forced to winding paths and sudden sharp turns by the grouping of the mountain chains; all this giving rise to the most complicated interweaving of the hydrographic and orographic systems. At the bottom of the deeply eroded valleys, generally narrow compared to the height of the precipitous mountain walls which close them in, are scattered the little oases and villages of two large provinces, Baltistan and Ladak, in a desert of stone, rocks and sand, naked and sterile beyond all imagining.

Such was the region which for the most part formed the theatre of our enterprise. The projected series of geophysical stations did indeed extend beyond it, as far as the plains of Eastern Turkestan; but the geological and geographical researches were carried out in the mountain zone of Baltistan and Ladak.

Besides this, the expedition, as I have said, proposed to explore the still unknown portion of the Eastern Karakoram. I will not repeat here the story of the exploration of the Karakoram and its glaciers. In the same year (1909) that saw the expedition of the Duke of the Abruzzi, Dr. T. G. Longstaff attempted to find and reach a pass of the chain east of the Baltoro, of which Colonel Sir Francis Younghusband had already had a glimpse when climbing toward it from the Oprang valley north of the Karakoram. Longstaff found his path crossed by an immense glacier, which proved to be the upper part, till then unsuspected, of the Siachen glacier, the source of the river Nubra, tributary of the Shayok, itself one of the most important tributaries of the upper Indus. The discovery of this great northern extension of the Siachen glacier proved the watershed of the Karakoram to be some 25 miles further north than its position as given up till then on the maps.[1] The Siachen glacier was then systematically explored in 1912 by Mrs. Bullock Workman's expedition, and the triangulation and survey of the entire glacial basin completed by one of its members, Grant Peterkin.[2] Its lower part was revisited in the summer of 1929 by Mr. and Mrs. Visser and Dr. R. Wyss, and the whole glacier was again traversed in 1930 by the expedition of Giotto Dainelli.

The Siachen was the eastern limit of exploration in the Karakoram until the present expedition. From it to the pass whence the entire chain of mountains took its name, a distance as the crow flies of about 30 miles, the mountain range, its valleys and the glaciers that come down from them were entirely unexplored. In this tract of the Karakoram was bound to lie the basin whence the Shayok river takes its rise. Many

[1] T. G. Longstaff, *Glacier Exploration in the Eastern Karakoram*; Geog. Jour., Vol. xxxv, June 1920, p. 622.

[2] F. Bullock Workman and W. Hunter Workman, *Two Summers in the Ice-Wilds of Eastern Karakoram*; London, 1917.

years before, the observation had been made that it sprang from certain glaciers flowing to the west of the Karakoram pass. Captain H. Strachey, in 1853, was the first, I believe, to point this out.[1] Eleven years later W. H. Johnson of the Indian Trigonometrical Survey crossed the high valley of the Shayok and made a report on some of its topographical characteristics, which then served as a basis for the region in the map of India. According to this, the Shayok has its sources in a group of glaciers of rather modest dimensions, one of which bears the name of Remo, and in a circular basin formed by an abrupt northward turn of the watershed and lying between these glaciers and the Karakoram pass.[2]

In the following year, 1865, Johnson once more passed near the source of the Shayok, on his return from a journey to Ilchi, the capital of Khotan in Chinese Turkestan; but despite this second visit he paid so little attention to the glaciers at the source of the river that he did not mention them at all in his account of his journey read before the Royal Geographical Society, nor did he indicate them in any way in the map which illustrated the printed narrative.[3]

On the other hand, Robert Shaw, the first English Commissioner at Ladak, who also visited the sources of the Shayok five years after Johnson, wrote that the river sprang from a vast *mer de glace*;[4] likewise Sir Douglas Forsyth, who passed the spot in 1873, returning from his second mission to Kashgar, speaks of a single huge glacier, from which the Shayok springs.[5] But neither Shaw nor any member of the Forsyth mission set foot on the glacier nor collected any other topographical data. The map based on the information supplied by Johnson in 1864 remained unaltered.

After Forsyth, nobody for 36 years mentioned the source of the Shayok. Caravans travelling between Ladak and Chinese Turkestan had up to a century ago passed close by the spot; but they were forced to abandon, a little below its source, the route *via* the narrow gorge through which the Shayok ran because of the glaciers advancing down the lateral valleys. They took to the open on the Depsang plateau, and thus the region was completely forsaken. We have to come down to 1910 to find another visitor, Dr. Longstaff, who, after having explored the Siachen, as we saw above, went up the bed of the Shayok river to the glacier whence it springs. He records an

[1] Captain H. Strachey, *Physical Geography of Western Tibet*; Jour. Roy. Geog. Soc., Vol. XXIII, 1853, pp. 38, 42, 55, 56, 57.

[2] The only notice I could find of the work done by Johnson is in Vol. VII of the *Synopsis of the Results of the Operations of the Great Trigonometrical Survey of India; North-West Himalaya Series and Kashmir*; Dehra Dun, 1879, pp. xxxviii-ix.

[3] W. H. Johnson, *Report on a Journey to Ilchi, the capital of Khotan, in Chinese Tartary*; Jour. Roy. Geog. Soc., Vol. XXXVII, 1867, p. 1.

[4] Robert Shaw, *Visits to High Tartary, Yarkand and Kashgar*; London, 1871, Chap. xvi, and p. 432, where there is also a colour plate of the glacier.

[5] *Autobiography and Reminiscences of Sir Douglas Forsyth*, edited by his daughter; London, 1887, p. 101.

impression of vastness and grandeur, which quite agrees with the descriptions of Shaw and Forsyth; and expresses considerable doubt as to the correctness of the map for that part of the Karakoram watershed.[1]

There was, then, every reason to think that the exploration of the basin whence the Shayok rises and of the adjacent part of the Karakoram would have been very fruitful. The case of the Siachen, a glacier about 50 miles long, unknown up to 1909, seemed to encourage high hopes of new geographical discoveries, and these were strengthened by the conjecture that a river as large as the Shayok must be fed by glaciers quite as large, in the mass, as those which, in the same mountain system and only a few miles away, gave rise to its tributary the Nubra.

Our plans also contemplated winding up our campaign of exploration by a visit to the valley of the Oprang, now known as the Shaksgam, on the other side of the Karakoram watershed. This valley is shown on the map, but its situation for the greater part of its length was very uncertain, not to say hypothetical. Colonel Sir Francis Younghusband, who discovered and partially explored it in 1887 and 1889, had neither time nor means to survey it. Thus there remained in doubt the position, direction and importance of the Aghil chain, which forms the right side of the Oprang valley, between the latter and the valley of the Yarkand. The course of our narrative will show how we failed in our attempt to reach the Oprang valley in the autumn of 1914; but also how, on the other hand, our exploration and survey extended far beyond the Shayok basin.

Our plans were completed by the end of the summer of 1912. We reckoned that our preparations and the organization of our enterprise would take about a year, and its execution about a year and a half. Thus we arranged to leave Italy in the late summer of 1913, cross the Himalayas in the autumn, and winter at Skardu, the capital of Baltistan. In the early months of 1914 we should leave Skardu and go up the Indus to Leh, the capital of Ladak, penetrating thence into the Karakoram, dedicating the whole summer to an exploration of unknown territory and descending in the autumn to Chinese Turkestan and the cities of Yarkand and Kashgar. Then by crossing the western end of the Tien Shan mountains, we should enter Russian Turkestan, regaining our own country before the end of the year, *via* the Transcaspian railway, the Caspian Sea and the Black Sea.

From the description I have given of our plan of campaign it will be clear that it falls into two parts. The autumn and winter of 1913 were to be spent in Baltistan, passing through fairly well known countries; whereas the spring and summer of 1914 would be the period of more intensive and varied work, when we should add to our researches in gravity and magnetism the exploration and survey of the Eastern Karakoram. This too would be the best time for observations on solar radiation, meteorology and aerology, in the stations to be set up on the high plateaux of the Karakoram.

[1] T. G. Longstaff, *op. cit.*, pp. 652–3.

Thus the personnel of the expedition, which in 1913 consisted of the group of people required for the work to be done in the first period, would need to be supplemented in the spring of 1914, in order to be able to develop the whole programme.

To begin with, Commander (now Admiral) Professor Alberto Alessio, with the consent of the Ministry of Marine, assumed the post of Second-in-Command. The various departments in our working programme were distributed as follows: to Commander Alessio, *docente* in theoretical geodesy in the university of Padua, and Professor Giorgio Abetti, astronomer at the Royal Observatory of the Collegio Romano and *docente* in astro-physics at the University of Rome (now Director of the Observatory at Arcetri and Professor of the University of Florence), the measurements of gravity and magnetism, the geodetic and astronomical observations. For the spring campaign of exploration we had in addition Major (now Lieutenant-Colonel) Henry Wood, R.E., of the Indian Trigonometrical Survey, well known for his survey work in India, Nepal and Tibet during the expedition of Sir Francis Younghusband to Lhasa in 1904, and Mr. John Alfred Spranger, M.A. Also the Indian Trigonometrical Survey appointed two of its surveyors for the plane-table survey, Jamna Prasad and Shib Lal. These men belonged to the line of native surveyors who since the times of Walker and Montgomerie in 1861 have done such great service to geography; penetrating in disguise as merchants or pilgrims the territories that were closed to Europeans, in particular Tibet, and making notes, observations and surveys of their routes, which then served as points of departure for all succeeding exploration. Jamna Prasad and Shib Lal joined the expedition in 1914 with Wood and Spranger.

The geographers and geologists of the expedition were Giotto Dainelli, Professor of Geography at the University of Pisa (now Professor of Geology at the University of Florence) and Olinto Marinelli, Professor of Geography in the University of Florence. Marinelli took part only in the second half of the expedition, in 1914; while Dainelli was with us from the beginning and carried on his shoulders the heavy task of studying, single-handed and in the heart of winter, the geology, glaciology and morphology of Baltistan and Ladak, as well as the ethnical and anthropological characteristics of their inhabitants.

Alessandro Amerio, Professor of Physics in the *Istituto Tecnico* of Padua, was chosen to direct the meteorological and aerological researches and the measurement of the various forms of radiation. He was to have left Italy with Marinelli and Spranger to join the expedition in the spring of 1914 and carry out the meteorological, aerological and radiological researches projected for the summer on the Depsang plateau. At the last moment a family loss prevented his departure. But Dr. Camillo Alessandri, Director of the Meteorological Observatory of Monte Rosa and meteorologist to the hydrographic survey of the *Magistrato alle Acque di Venezia*, was fortunately able to take his place, despite the brief time remaining for preparation. As our second meteorologist we had already chosen Marchese Nello Venturi Ginori, who was with

the expedition from the first, and who, during the autumn and winter of 1913–14, made a preliminary series of observations in Baltistan which served in calculating the altimetric data needed for the geodetic and topographical work with reference to the gravimetric and magnetic stations.

Lastly, the resources of the expedition had to include a photographic equipment to preserve records of our varied operations, to take pictures of the regions which we crossed and the peoples who inhabited them, and to serve as subsidiary to our topographical work. The photography was undertaken by Lieutenant (now Colonel) Cesare Antilli, Director of the Military Photographic Section, who of course was with the expedition from the beginning.

We should have been glad of two Alpine guides for the exploration of the glaciers of the Eastern Karakoram; but our party was already so large that we had misgivings on the score of food supplies and transportation facilities. However, it would have been foolhardy to attempt to do without any guide whatever, since only a small fraction of the party had any mountaineering experience; and I shall ever be grateful to Giuseppe Petigax, the famous Val d'Aosta guide, who accompanied the Duke of the Abruzzi on all his expeditions, for undertaking the entire responsibility of guiding the survey caravans upon the unknown glaciers of the Eastern Karakoram. Petigax, indeed, was incomparable at all stages of our expedition: an expert of caravan journeys in the most diverse conditions and among the most diverse populations, broken to all the hardships of an explorer's life, endowed with that unalterable serenity in the face of obstacles, which comes from having surmounted so many and such serious ones that none can dismay him; truly an ideal assistant to the director of an expedition. I knew what I was about when I arranged to have him with us from the start.

Thus a party of eleven Europeans was got together, of whom seven—Alessio, Abetti, Dainelli, Ginori, Antilli, Petigax and I—left Italy in 1913, the four others joining us at Leh in the spring of 1914.

The expedition was indebted to the Italian government for the greater part of its costly and elaborate scientific equipment. From the hydrographic institute of Genoa came all the instruments for the observation of relative gravity and magnetism, for the astronomical observations and the geodetic survey of the district, and the apparatus for a wireless receiving station. The military photographic section furnished the apparatus for photography and telephotography, also part of the plates. The aerological station of Vigna di Valle at Bracciano, the Polytechnic School at Padua, and the Observatory of Monte Rosa presented most of the meteorological and aerological instruments and those for the measurement of solar radiation (pyrheliometry). Another pyrheliometer was lent to the expedition by Professor C. G. Abbot, Director of the Observatory of Astrophysics at the Smithsonian Institution of Washington; and an extra set of gravimetric pendulums by the Prussian Geodetic Institute of Potsdam.

At the charge of the expedition remained a certain number of meteorological and

aerological instruments, pocket chronometers in addition to those from the Naval Hydrographic Institute, and a few other things.

All the instruments were chosen with the very greatest care, not only for their precision but also for their strength; as they had to withstand the vicissitudes of hard travel over rough and poorly marked roads, and to be carried on the backs of men or beasts of burden. More than one instrument had to be adapted to permit of its being taken apart for packing in separate loads, and instruments and parts of instruments were fitted into cases specially made to protect them from the inevitable accidents of travel. Even so, there were pieces impossible to take apart, each of which in their cases made an awkwardly shaped pack of from 85 to 90 pounds. But our stout Baltis and Ladakis never failed to carry them all wherever we had need of them.

While this scientific material was being got ready, I busied myself with collecting the means for the execution of our enterprise, and in equipping and organizing the expedition.

The contributions of His Majesty the King of Italy and various private Maecenases, added to those of the scientific academies and societies, had soon nearly completed the necessary sum, which was fixed at about £10,000.[1]

As for the organization, the first preliminary was the necessary permission from the Government of India, and not only its permission but also its direct support. Without this there could be no thought of undertaking an enterprise which could only succeed with the goodwill and the co-operation of the officials and the populations of the countries through which we must pass. The inhabitants of Baltistan and Ladak are subjects of H.H. the Maharajah of Jammu and Kashmir, and only the Government of India had the authority to claim from them the widest possible measure of official assistance. Moreover, for the complete development of our scientific programme we should need the collaboration of various technical departments of the Indian government, and for this too arrangements had to be made beforehand.

My plan was received with great favour in India; not only were all our requests granted, but the government offered a substantial contribution. Colonel Sir Sidney Burrard, at that time Surveyor-General of India, Colonel Sir Gerald P. Lenox Conyngham, then Director of the Trigonometrical Survey, and Mr. G. T. Walker, Director of the meteorological services, assured us of the co-operation of their staffs; and the Trigonometrical Survey paid the expenses of Major Wood and the two Indian surveyors in the expedition.

Doubtless it would be quite easy to equip an expedition at all points in India. But our needs were so special, and dependent upon such unusual exigencies, that it seemed best to make all the preparations in Europe, under our personal supervision. We had to contrive special tents to serve as scientific stations. As for our own accom-

[1] See the Appendix of the Italian edition for the financial report of the expedition, with the list of contributors and account of expenses.

modation, food supplies and personal equipment, we had to consider not only the several seasons our campaign would last but also the very varied climatic conditions which we should encounter *en route*, in the heights and the valleys, the plateaux and glaciers we must cross. And we knew that we must assure ourselves a certain measure of physical well-being, for without it we should not be able to sustain the prolonged effort of scientific work under such abnormal living conditions.

The food supplies were a matter for special study. It is hard to provide appetizing and nourishing food for such a length of time and under such difficult conditions of transportation; and if monotony of diet joins with the hard work in the rarefied atmosphere to make one lose one's appetite, there is a constant feeling of fatigue and performance suffers accordingly. In our case, moreover, the food supplies had to be varied in another way: one kind of provisions being furnished for the periods when we were in inhabited regions where we could get fresh food, and quite another kind for our marches across desert wastes, for example during the campaign of the spring of 1914.

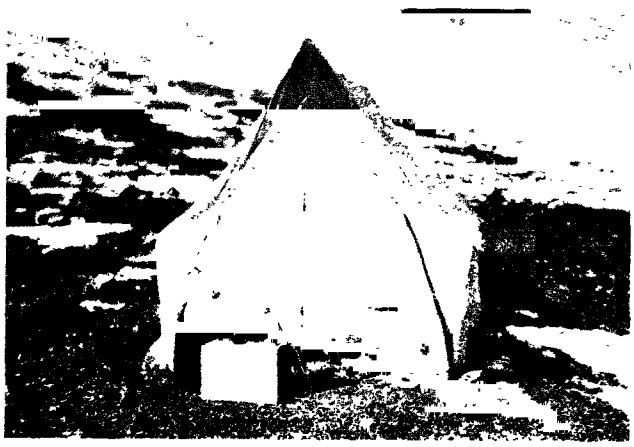
In the end, therefore, we divided the whole time of our expedition into seven periods, to each of which corresponded a certain number of cases of provisions, varied in quantity and quality according to the conditions in which they were to be used. These periods, in the following order, mark the successive phases of the expedition:

1. Journey from Kashmir to Skardu in Baltistan.
2. Winter in Skardu and journey from Skardu to Kargil on the border between Baltistan and Ladak.
3. Journey from Kargil to Leh in Ladak.
4. Stay of about two months in Leh.
5. Journey from Leh to the Depsang plateau.
6. Campaign of exploration in Eastern Karakoram.
7. Journey across Chinese Turkestan up to the border of Russian Turkestan.

Another consideration, apart from those which I have mentioned, was the necessity of sending on the provisions to the different regions where they would be needed, even before the expedition itself got under way. The food shipments alone made 270 loads, with a total weight of over 13,500 pounds, requiring to transport them 135 horses; while the camping outfit, the personal luggage and scientific equipment would require a concentration of all the means of transport which we could command either in Baltistan or in Ladak. We therefore sent all the provisions directly to Kashmir two months before we ourselves left Europe, and they were speedily distributed by special caravans between Skardu, Kargil and Leh, in which last place were provisionally deposited the sets of cases belonging to sections 4, 5, 6 and 7 of the journey. By this arrangement we avoided setting out from Kashmir burdened with our stock of supplies for the whole campaign; and also the same porters and pack-horses were free to be used for the second time.

The camping outfit and equipment for the native porters and servants, and such woollens as they would need in the high mountains, were bought in India and sent direct to Kashmir. We were also able to get in India 16 steel cylinders containing hydrogen gas for the pilot balloons which were to be used in the study of high-altitude air currents. These cylinders were distributed between Skardu and Leh at the same time as the provisions.

All our preparations were finished by July. The scientific instruments had been compared and verified, the gravimetric pendulums tested at the base station in Genoa, which became our reference station for the gravimetric observations made during the campaign. The expedition was ready to leave Italy.



CHAPTER II

FROM ITALY TO BALTISTAN

Departure from Italy, arrival in India—Dehra Dun—Vicissitudes in the history of Kashmir—The realm of Jammu-Kashmir—The country as it is to-day—The expedition at work—Srinagar—Making up the caravan—The expedition leaves Srinagar—Ascending the Sind valley—The Zoji-la—Dras: setting up the station and work of the expedition—Descent of the Dras and Suru valleys—The valley of the Indus—The station at Tolti—Dainelli's operations—Confluence of the Shayok and the Indus—The expedition arrives at Skardu.

PADRE IPPOLITO DESIDERI of Pistoia, missionary to Lhasa in Tibet at the beginning of the eighteenth century, wrote of the journey from Italy to Leh, the capital of Ladak or Second Tibet:

"It is not to be embarked upon either by merchants or by anybody merely bent on visiting strange countries; but may be undertaken solely by missionary evangelists full of a spirit that loves suffering and hardship and is fired by zeal for the glory of God and the cure of souls. Now such a one, wishing to travel to Second Tibet, goes first to Goa or to Bengala, and from Goa and from Surat, or indeed from Bengala, passes to Delly (Delhi) the capital of the Mogul; thence to Cascimir, to Little Tibet (Baltistan) and thence to Lhata (Leh), the capital of Second Tibet. Thus, leaving, e.g. in October or November of 1728, he cannot hope to arrive at Leh but in the month of June of 1731"[1]—

in other words, after travelling for some two years and eight months!

To-day the trip from Italy to Leh, via Bombay, Delhi and Kashmir, may be

[1] Carlo Puini, *Il Tibet secondo la relazione del viaggio del P. Ippolito Desideri* (1715–21); Mem. Soc. Geogr. Ital. Vol. X, 1904, pp. 81–2; and *An Account of Tibet, The Travels of Ippolito Desideri of Pistoia, S.J., 1712–1727*, edited by Filippo DeFilippi, with an Introduction by C. Wessels, S.J. Broadway Travellers' Series, London, 1931.

made in forty days without undue strain, and has ceased to be adventurous even in the stretch from Kashmir to Leh, if taken at the right season.

We landed at Bombay on August the 22nd, 1913, with the scientific equipment of the expedition and our personal effects. The evening of the same day we continued our journey by rail, reaching Delhi about the middle of the second night. There we divided into groups. Alessio and Abetti betook themselves (with the gravity and magnetic instruments and the wireless receiving apparatus) to Dehra Dun, the headquarters of the Indian Trigonometrical Survey, where they arranged with the Director, Colonel Lenox Conyngham, the programme of operations, and completed the comparison of the gravimetric pendulums of the expedition with those of the station at Dehra Dun. They also experimented with the transmission of time-signals by wireless. Dainelli, Antilli, Ginori and Petigax continued their journey from Delhi to Lahore and Rawal Pindi, where they left the railway and went up to Kashmir by the carriage road.

I for my part proceeded to Simla, where I arranged with Dr. G. T. Walker the programme of meteorological and aerological work to be carried out by various meteorological stations in India in connection with the observations taken by the expedition. At Simla I had an opportunity to thank H.E. the Viceroy, Lord Hardinge of Penshurst, for his very cordial reception of our plans and for the interest which he took in all our preparations. Among the many kindnesses which I received at Simla I must record the offer of a complete medical equipment from the St. John's Ambulance Corps (since united with the British Red Cross). This I had already provided, but I most gratefully accepted two excellent first-aid medical and surgical outfits, to be used by the caravans which were to split off from the main body of the expedition. I stopped four days at Simla, leaving to rejoin my companions at Srinagar.

Kashmir has long since been classified and described in the conventional Baedeker formulas.[1] Since the building of a carriage road some 200 miles long from Rawal Pindi to the plateau, and with the opening of an hotel of the Indo-European type at Srinagar, arriving and stopping there are as simple and easy as at any Alpine resort. A railway has been talked of ever since 1891, some day there will surely be one. But as yet the lovely, fertile plain, lying some 5,000 feet above sea-level, with the snowy peaks of the Himalayas framing it on the north and the chain of Pir Panjal on the south, has not an international clientèle. However, like Darjeeling at the other end of the Himalayas, nearly a thousand miles away, it is a godsend to Anglo-Indians and their families as a retreat from the climatic trials of the Indian plain.

There was a time, now very remote, when Kashmir possessed distinct historical significance. Toward the middle of the third century B.C. there came thither mis-

[1] There are two excellent Guides to Kashmir : that of Dr. Arthur Neve, which has passed through several editions, and the more ambitious one of Joshua Duke, which is truly a monograph upon the region.

sionaries sent by the Emperor Asoka, the Constantine of Buddhism. From Kashmir the new religion spread into Central Asia and China; and it was also in Kashmir that an important Buddhist council was held, between the first and second centuries A.D., in the reign of Kanishka.

The high degree of culture which prevailed in Kashmir for many centuries is proven by its series of chronicles, poems in Sanscrit going back to legendary times. By the seventh century they become an ordered historical account of the period of Kashmir independence under its own Hindu sovereigns.[1] This period, with its alternation of warrior sovereigns and women regents, of wars of conquest and internal struggles, lasted until the beginning of the fourteenth century, when the last king was deposed by his Mohammedan minister, who became the first ruler of a national Islamic dynasty which endured for 250 years.

The conquest of Akbar, in 1586, marked the end of Kashmir independence. Up till the middle of the eighteenth century it was part of the Moghul Empire of India and became the summer residence of the emperors and their wives, who made of it a place of delights, transporting thither the splendours of the courts of Agra and Delhi. The Mohammedan historians of India and the Persian stories of Kashmir give accounts of this period.

Akbar, Jehangir and his much-loved wife Nur Jahan, Shah Jahan and Aurangzeb built hundreds of country seats and pleasure gardens on the banks of the Dal, the famous lake of Srinagar; it was they who planted the majestic plane-trees, the *chenars*, which survive to-day, embowering the environs of the capital in fresh leafy shade. They erected monumental mosques, in short they made of Srinagar and Kashmir a paradise of loveliness and prosperity. Some letters of the physician François Bernier, attached to the court of Aurangzeb, describe a journey which he made in 1665 to Kashmir in the train of the emperor, with all the pomp and luxury of the Orient of those times, and give some interesting details of the conditions then prevailing.[2]

Fifty years after Bernier, our own Padre Ippolito Desideri spent several months in Kashmir before pursuing his journey through Ladak and Tibet; but his narrative gives no description of the country.

The decline of the Moghul power in India meant a loosening of its grip upon this distant province—and the Pathans were not slow to profit by the fact. This predatory tribe subject to the Kingdom of Afghanistan, with headquarters on the western border of Kashmir, seized that country in 1751, and for 60 years it endured the cruelties of subjugation, despoiled of the embellishments of its Moghul occupation, robbed of all its native wealth by rapacious and insatiable governors. In a book by George Foster, an official

[1] See the erudite translation and commentary of the *Chronicle of Kalhana*, called Rajatarangini by Sir Aurel Stein (two volumes, 1900), and also his excellent *Ancient Geography of Kashmir*.

[2] François Bernier, *Travels in the Mogol Empire*, A.D. 1656–68, translated by Archibald Constable; London, 1891, pp. 350–428.

of the Hon. East India Company, who visited Kashmir 30 years after the Afghan conquest, we find some account of this period.[1]

Meanwhile, in India, as the Moghul power decayed, there was growing up a new nation; sprung from a Hindu sect, the Sikhs, but the particular creation of Ranjit Singh, "the Lion of the Punjab." He organized a strong army under European officers, among them General Ventura, from Modena, and the Neapolitan Avitabile, famous for the conquest of Peshawar.[2]

Ranjit Singh's conflict with the Afghans led to the conquest of Kashmir in 1819. In the five centuries of Mohammedan domination the country had been entirely converted to Islam. But it had not lost the tradition of the holy places of Hinduism, for which Kashmir was celebrated; neither the zeal of so many fanatical sovereigns, from Sikander the Iconoclast at the end of the 15th century to Aurangzeb between the 16th and 17th, nor the destructive force of weather or earthquakes had succeeded in wiping out the Buddhist and Hindu monuments. Important remains are still scattered throughout the country, in classic Greco-Buddhistic style recalling Gandhara, stone thrones, phallic emblems (*lingam*), curious little temples which are stone models of ancient edifices, sculptured images. Pilgrims still come in hosts to the sacred springs of the innumerable water-courses which issue from every valley and gorge of the vast basin.

Many European travellers visited Kashmir during the brief period of Sikh domination: William Moorcroft, with Guthrie and Trebeck in 1823, Victor Jacquemont in 1831, Joseph Wolff in 1832; and in 1835 Vigne returning from Baltistan, Dr. John Henderson coming from Ladak and Baron Hügel, climbing hitherward from the Punjab, all met together at Srinagar.[3] They concur in finding the Sikh regime quite as cruel and predatory as that of the Pathans had been. The country was exhausted, the people in the most abject state, decimated by earthquakes, flood, famine, pestilence,

[1] George Foster, *Journey from Bengal to England, by Kashmire, Afghanistan, Persia, Russia*; 2 vols., London, 1808.

[2] There is a biography of Avitabile, written by Julian J. Cotton, Calcutta, 1906. See also an account of a meeting with General Avitabile, then Governor of Wazirabad, in Joseph Wolff, *Travels and Adventures*; London, 1860, Vol. II, pp. 66–7.

[3] William Moorcroft and George Trebeck, *Travels in the Himalayan Provinces of Hindustan and the Punjab*, etc., from 1819 to 1825. Edited by H. Hayman Wilson. Two vols., London, 1861. Devotes several chapters to a precise and minute description of the arts and manufactures of Kashmir, particularly the making of the famous shawls; Victor Jacquemont, *Letters Describing a Journey in India, Tibet, Lahore and Cashmere*, 1828–1831, by order of the French government. Two vols., 1834; Dr. Joseph Wolff, *op. cit.*; G. T. Vigne, *Travels in Kashmir, Ladak, Iskardo*, etc. Two vols., London, 1842. The entire first volume and part of the second are devoted to Kashmir, all the settlements of the basin and its adjacent valleys are described with a wealth of detail, with accounts of myths and legends, enumeration of the monuments, etc.; C. H. Hügel, *Travels in Kashmir and the Punjab*, etc., London, 1845; less important.

fires and emigration. Eighty years of misgovernment had made of that fertile valley, sung by poets as a terrestrial paradise, one of the most miserable on the earth.

On the death of Ranjit Singh, his loosely knit empire fell prey to anarchy, and in no long time found itself in conflict with the English. Followed the downfall of the Sikh power; Kashmir passed to the English as a war indemnity, and by them was ceded to Gulab Singh, formerly chief vassal of Ranjit Singh in the petty state of Jammu, in return for a payment of 7,500,000 rupees. Gulab Singh thus became the Maharajah of Jammu and Kashmir, to which were added Ladak and Baltistan, conquered for him by General Zorawar Singh between 1835 and 1840.

The present Maharajah, Sir Hari Singh, is fourth in line, having succeeded to Sir Pratab Singh in 1925. His kingdom covers almost 70,000 square miles, and takes in all the mountainous zone between the plain of the Punjab and the Indo-Asiatic watershed of the Hindu Kush and the Karakoram, between Tibet on the east and Afghanistan on the west. The Himalayan range crosses this territory diagonally from north-west to south-east, and south of it lie Kashmir, with a population of a different race and language, most of them Sunni Mohammedans, and Jammu, inhabited by Hindus, contiguous to the plain; while north of it are Ladak, with a Lamaist Tibetan people, Baltistan with a mixed population of Shiah Mohammedans, and besides these the districts of Astor, Gilgit, Hunza and Nagar, populated by Shiah Dards.

With the establishment of the Dogra dynasty—so called after its country of origin, near Jammu—Kashmir was opened to European visitors, who became more numerous with the passage of time. Among the first to visit it after the beginning of the new regime should be mentioned the Piedmontese Osvaldo Roero di Cortanze. For more than 20 years (1853–75) he lived in the territories of the Maharajah, and also made lengthy journeys in Baltistan and Ladak, as far as the desert and almost unknown plateaux of Chang Chenmo and Aksai-Chin, east of the Shayok valley.[1]

The new regime, under the British protectorate, has produced in a few decades an enormous change throughout the country. Administered by a humane government and assisted by the natural riches of the very fertile basin and the remarkable ingenuity of its people, the land has risen anew from the marasmus into which it had fallen. The Maharajah pressed into the service of the state English ex-officials tested in every branch of the administration. One after another the worst extortions were suppressed; the heavy *dastur* (the forced requisition of labour, which caused the mass deportation of the peasants, often at the sowing or harvesting season) was abolished, and the system of land-tax was completely revised. With renewed hope of enjoying the fruit of their

[1] Roero di Cortanze described his travels in three little volumes, in which he shows himself an acute and a just observer, also a modest traveller who makes light of dangers and discomforts. His *Ricordi dei viaggi al Cashemir, Piccolo e Medio Thibet e Turchestan* (Turin, 1881) are interesting and pleasant reading to this day.

labours, the farmers regained their attachment to the soil, and the calamity of emigration was cured.

The most important remaining work is the regulation of the bed of the Jhelum, to prevent the disastrous floods which periodically devastate the country-side, and are, with the storms, the principal cause of the loss of harvest and consequent famine. Much remains to be done—as in all of the East—to prevent epidemics, principally cholera and smallpox.

The opening of the carriage road in 1890 certainly had a most important effect in hastening reform. It rendered the province accessible at all seasons of the year, permitting a direct and continuous state control.

But the anomalous situation still remains: here is a country of 800,000 inhabitants, of whom 93 per cent are Mohammedans, governed by Hindu sovereigns; and almost all the high functionaries and officials of state are Hindu pundits, this being the only race sufficiently educated to be capable of administrative duties. The people are nearly all agricultural, living in scattered villages throughout the basin. There is but one city worthy of the name: Srinagar, the capital, with 120,000 inhabitants, situated in a ravishingly beautiful site at the foot of the hill called Takt-i-Suliman, on the banks of the Jhelum and the Dal. The industries of the country are concentrated in Srinagar: silk-spinning, shawl-weaving, carpet and cloth manufacture, with the minor arts of wood sculpture and work in leather and hammered metal, lace-making and the manufacture of Persian lacquered papier mâché. These trades have from time immemorial given to the Kashmiris their reputation as fine craftsmen; with the improved condition of the people and the easy communications they will be an ever-increasing source of riches, to say nothing of the exportable farm produce, which is abundant and of great value.[1]

On September 8th our party was once more reunited by the arrival of Alessio and Abetti from Dehra Dun. There was much to do, and little time to stroll in the bazaar or among the city's mosques and temples, or to glide in the light *shikara* boats up and down the winding Jhelum, flanked by the principal palaces like the Grand Canal in Venice; or to float upon the Dal, among fields of blossoming water-lilies and the characteristic floating gardens, opposite the villas and gardens of the Moghuls.

Alessio and Abetti installed the gravimetric apparatus in the cellar of the English club, and the astronomical and magnetic station on the tennis courts hard by; and for ten days were busy with geophysical observations. Meanwhile Ginori verified the meteorological instruments by comparison with those in the Srinagar observatory, and

[1] I will not describe here the physical characteristics and scenery of Kashmir. For a comprehensive view of present conditions in Kashmir, of its people, social and religious customs, of life in town and country, one cannot do better than to read Walter A. Lawrence's *The Valley of Kashmir*; London, 1895. For a general treatment of all the territories governed by the Maharajah, there is the painstaking work of F. Drew, *The Jummoo and Kashmir Territories*; London, 1875.

Dainelli explored the basin in long geological excursions and collected fossils on the spurs of Pir Panjal and in the tributary valleys.

It was my task to make the final arrangements for our actual setting forth. The job would be easy in any country save Kashmir. To get together the few indispensable servants, *kansamah*, *bearers*, *dobi* and *sais*—which is to say cook, personal servants, laundryman, grooms—who should have some idea of their respective tasks (as a rule one has to teach them the rudiments of their duties), be *personae gratae* to the *shikari* or head of caravan, without feuds among themselves but at the same time not too much in league to the prejudice of their employer: this requires infinite patience and interminable discussions, although the arrangements are always the same; from the fuss that takes place one would imagine that each new caravan was the first that ever set forth from Kashmir. You let fall a word of inquiry; straightway rises up a host of applicants and hangers-on, all abundantly provided with *chits* or testimonials, that persecutes you unceasingly, either in person, or in long letters in the florid style of the public letter-writer.

Then there are the merchants and purveyors of every sort of merchandise; their importunities last from morning till night. They waylay you as you issue from your hotel, they trail you everywhere, follow you even to your bedroom; sometimes even force is needed to rid you of them. It is clear that the "foreigner business" prospers in Kashmir; and these impertinent parasites are surely in part responsible for the bad name Kashmir has received from those who write of her.

The few items of equipment still lacking were quickly got together: a number of *kiltas* (light but strong leather-covered osier hold-alls, either round or trunk-shaped); saddles for us Europeans; blankets and extra horseshoes for the horses; kitchen outfit for the servants. For the rest, our European equipment was complete in every detail.

But a greater task remained: we had to sort out and classify all the material and pack it into suitable loads. I have already described the plan by which our food supplies had been sent across the Himalayas and distributed in the several districts where we should need them. About 20 cases were all we had left for our journey to Skardu; but there was our personal luggage, the camping outfit and all the instruments: another 235 bundles, far too many for the resources of the valleys through which we should pass. So, some ten days before we left, I sent ahead a convoy of 45 horses with 97 loads, in charge of the *shikari* Khazra, with orders to continue to Dras, on the other side of the Himalayan pass.

These varied labours were from time to time pleasantly interrupted by the hospitality of Mrs. Frazer, wife of the Resident, himself absent inspecting the northern districts, and of other English officials. I had also the honour of an audience with His Highness Sir Pratab Singh, and thanked him for the cordial co-operation we had received from all his officials, in particular from the Governor of Kashmir, Chanduri

Khushi Muhammad, distinguished poet and man of letters, who made all arrangements for our journey up to the frontier of Kashmir.

We were setting out for the Himalayas just at the season when those who go there every year for holidays or the shooting were coming down again to their winter occupations. During our stay at Srinagar we had seen more than one caravan pass. On September 20th Mario Piacenza and Dr. Borelli arrived, on their way home from a successful expedition to the Nun Kun group. Count Calciati, the geologist, had stopped on the other side of the Himalayas to finish the survey work.

A few days later came Lieutenant (now Major) Kenneth Mason of the Indian Trigonometrical Survey, who had just successfully completed an important piece of geodetic work, joining up the Indian Survey with that of Russian Turkestan.[1] With him was the *Shikari* Abdullah, who had been *caravan-bashi* with the Duke of the Abruzzi in 1909, now to serve with Khazra on our expedition. The last addition to our personnel was the agent Alexander Robert, an Eurasian who had been in the service of Dr. Sven Hedin on his Tibetan expedition of 1906. It was he who before our arrival had superintended the distribution of the food supplies to Baltistan and Ladak.

And I must not fail to speak of two faithful camp-followers who perhaps enjoyed the expedition more than anyone else: Sim, a rough-haired terrier, small but doughty and pugnacious like all his race, and Alab, a black setter, gentle, sweet tempered, timorous. Both survived the great adventure and returned to Europe with their masters.

On the morning of September 20th all the remaining baggage was embarked upon five boats and sent by water to Gunderbal, the first stage of our journey, at the mouth of the Sind valley in the plain of Kashmir. Next morning we bade adieu to civilized life and set forth upon our long Odyssey.

From Srinagar to Skardu, the capital of Baltistan, we took the route which I had already covered in April 1909 with the Duke of the Abruzzi; mounting to the Zoji-la by the Sind valley and descending thence by the Gumber and Suru-Dras valleys to the Indus; then following this latter valley down to Skardu.

Then it had been spring. The upper Sind valley, the pass and a good part of the

[1] As early as 1843 Colonel Everest had suggested this connection, so as to obtain the measure of a meridian arc from Cape Comorin at the southern extremity of India to Nova Zembla in the Arctic Ocean: W. H. Purdon, *On the Trigonometrical Survey and Physical Configuration of the Valley of Kashmir*; Jour. Roy. Geog. Soc., Vol. XXXI, 1861, p. 14. The suggestion was not taken up until 1909, in one of the triennial meetings of the International Geodetic Association. Its execution was entrusted to English and Russian geodesists, and took 3 years of hard work. A chain of 33 stations was made, at an average height of about 16,250 feet above sea-level (the highest being about 18,850 feet), crossing the districts of Gilgit and Hunza, the Himalayas and Pamir. The official account of this important piece of work forms Vol. VI of the *Records of the Survey of India*, under the title *Completion of the Link connecting the Triangulations of India and Russia*; Trig. Surv., Dehra Dun, 1914. Major Kenneth Mason has also published a short account in Geog. Jour., Vol. XLIII, 1914, p. 664.

Gumber valley had lain still deep in snow, which we had to plough through on foot. Now, at the end of September, it was a safe and easy road for pack- and saddle-horses. Further down, the oases of Baltistan had shed their blossom long ago, the apricots were picked, the harvests gathered in. But in the trans-Himalayan region spring and autumn are all one; the seasons alternate in vain in the arid desolation of that vast desert of stone—that "ruin of mountains" as Desideri pithily called it.

Even so our present journey was well diversified from my earlier one. That had been a swift and simple transit to a still-distant goal; but now everything was a field for the scientific labours of our expedition, and we took more than a month to cover the ground which the Duke of the Abruzzi had traversed in sixteen days. Yet there remains little for me to say of it, since a detailed description is included in the previous book, where it occupies five chapters. The geographical questions there dealt with are reconsidered in the scientific reports by Dainelli on the basis of the new evidence collected.

I therefore confine myself here to a succinct account of our life, with but few notes on the route.

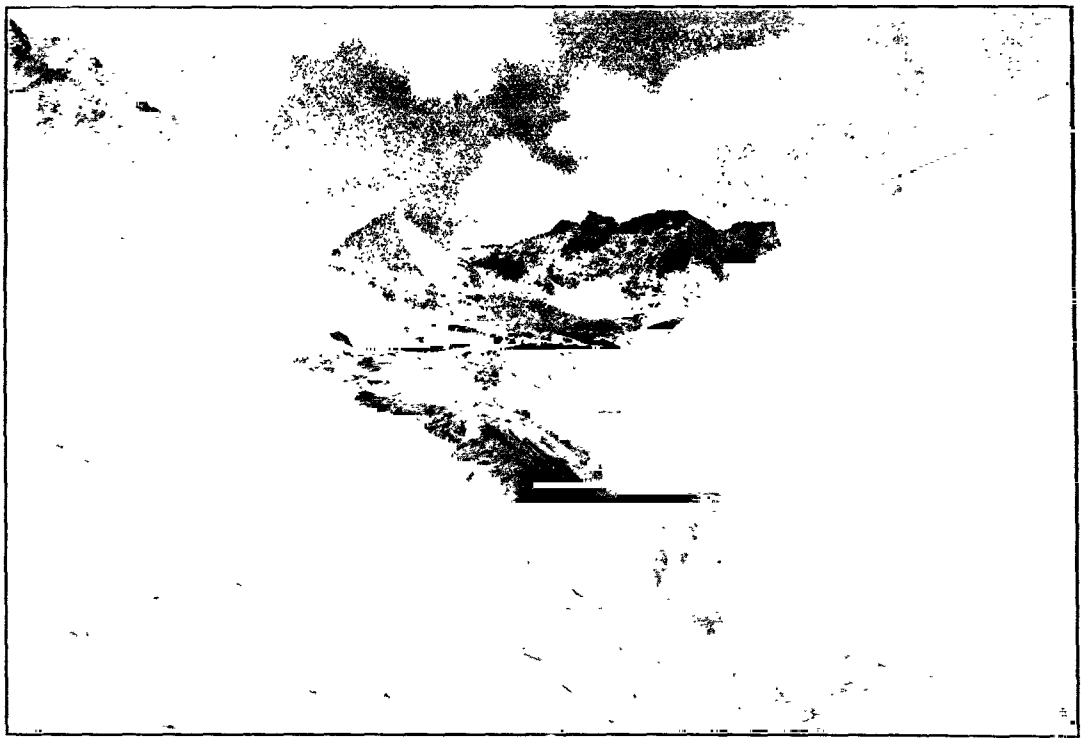
The expedition, then, left Srinagar on the morning of September 21st to cross the plain north of the city and reach the village of Gunderbal at the mouth of the Sind valley. On two *tongas* or two-wheeled carriages we loaded our most delicate instruments: the mercury barometers, the gravimetric pendulums, the chronometers, which always travelled under our very eyes and, save on this one stage, on the backs of coolies. With these went the *kiltas* or chests of rupees and annas for paying the caravans. Two of us accompanied the *tongas*. The others preferred to cover the stage on horseback, and chose the better part, for we had seven good saddle-horses hired from the government of Kashmir; while the road or rather country lane which we followed had many holes in it, forcing the vehicles to a funeral pace, and giving us great concern for our instruments. Never in all our journey were they again in such danger. Fortunately all went well, and we reached Gunderbal almost at the same time as the barges which had left Srinagar the day before us to navigate the Jhelum and the Sind. We took time to set up our first camp pleasantly and comfortably under a group of majestic plane-trees (*chenar*), and all the various services fell quickly into order. The comfort of the entire trip depends upon these first arrangements; the servants are soon broken to their tasks and after a few days all goes smoothly and almost automatically.

We left Gunderbal with a caravan of 71 pack-horses and 17 porters. Kashmiris and Baltis do not love to go far from their own villages; every two or three stages, sometimes after a single one, we had to dismiss men and animals and take on new ones.

We went up the valley of the Sind in three marches, but Dainelli's geological investigations kept us a whole day at Sonamarg. The lovely valley was full of autumnal colour and the red and gold of the deciduous trees made a rich mosaic among the green of the fir-trees. The weather was very fine, with some passing storms that sprinkled the

the Turkestani were seeking refuge from a hard and hungry winter among the mountains. They defeated 400 defenders of the pass and got down to Srinagar in only two stages, where the Mohammedan king, Muhammad Shah, made a virtue of necessity and entertained them until the spring.[1]

Later military expeditions across the Zoji-la were made by Zorawar Singh, the



Metchuhoi glacier, Gumber valley.

general of the Dogra prince Gulab Singh, during the conquest of Ladak and Baltistan between 1834 and 1840.

On the other side of the pass the descent into the Gumber valley [2] is most gradual,

[1] See Bellew, *op. cit.*, pp. 95–7. He gives and discusses the history of the Mongol khans of Kashgar, taken from the Tarik-i-Rashidi (The Annals of Rashid, the khan then reigning) written at Srinagar in 1544 by Mirza Muhammad Haidar.

[2] Most travellers have thought that the River Dras comes from the eastern slope of the Zoji-la. Among them Cunningham (*op. cit.*, p. 98), Hermann von Schlagintweit (*Reisen in Indien und Hochasien*; Jena, 1869–80, Vol. III, p. 248, and also Sven Hedin (*Trans-Himalaya*; London, 1909–13, Vol. I, p. 39). Actually, the Zoji-la leads into the Gumber valley. The Dras is formed from the confluence of the latter with the Mushki, which is of much greater volume and flows from a large basin north of the Gumber.

indeed hardly perceptible; it crosses the flats or terraces of Minimurg, Mutaiun and Pandras, with short narrow stretches between. We made a single stage at Metchuhoi, beside a nameless glacier that almost touches the path with its tongue, at about 10,800 feet above sea-level. On our way down we overtook the *tehsildar* or prefect of the district of Kargil, who was on his way home; we also met the *waẓir-i-waẓarat*, Hashmatullah Khan, governor of Ladak and Baltistan, going to Srinagar on official duty. He recrossed the Himalayas in time to overtake us at Skardu, and after that we were in constant touch with him.

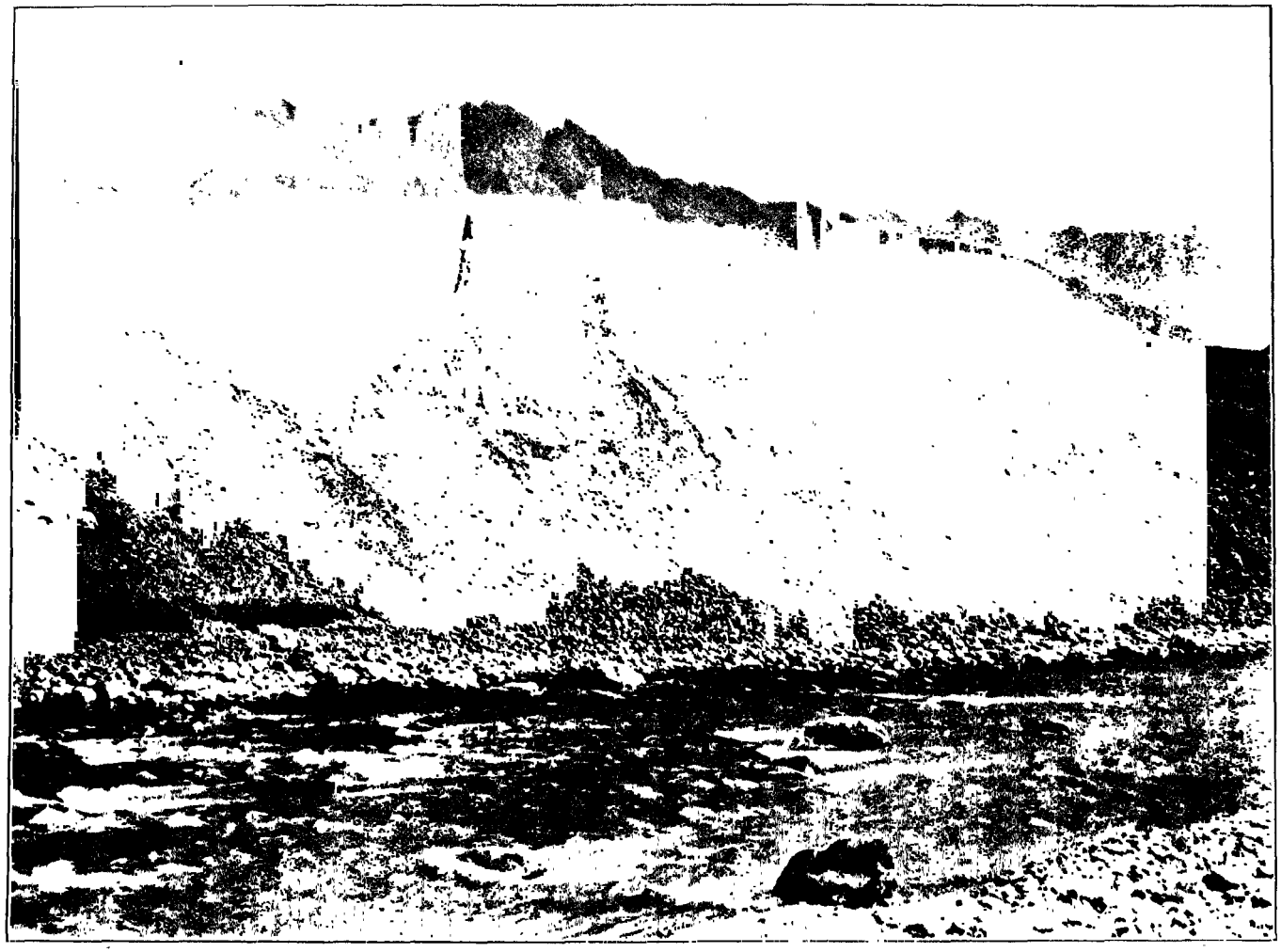
On September 27th we came out of the narrow gorge at the end of the Gumber valley and issued into the great circle of mountains which encloses Dras, at 10,600 feet above sea-level. Soon we had reached the station, a little clump of poplars and willows, with the post and telegraph building, and a long low structure, the *serai* for the native caravans. Not far off, a little higher up, was the rest-house for Europeans and officials—it looks rather more like a Swiss châlet than an Indian bungalow.

Inhabitants of Dras.

Dras was another of the proposed stations for our gravimetric, magnetic and astronomical observations, and the accompanying topographical and meteorological work. The bungalow housed us, two in a room, and the photographic studio and dark room as well. We set up the meteorological shed in front of the post office. For the gravimetric observations we used one of the little rooms of the *serai*. We rolled into it a stone weighing a ton or more and buried it in the ground, cementing it with wet clay, to make a base for the Sterneck apparatus. We followed the same plan in all our subsequent stations, and it proved very satisfactory. Near the *serai* we set up the magnetic and astronomical tent.

The work went on steadily for ten days. Alessio and Abetti spent their days and part of their nights in observations and did not always stop even for their meals. Dainelli completed the geological survey of the basin. He climbed up some of the surrounding mountains and visited the villages scattered on the large flat terraces which stretch right round the circus at the foot of the ranges. They are peopled by a mixed Dard-Tibetan-Kashmiri folk,—all Mohammedans, however, since the time of Desideri, although the region had belonged to the kingdom of Ladak until the middle of the last century, when it was made administratively dependent upon Baltistan.

The middle of the plain, crossed by the river and the caravan route, is almost



Ruined fort of Dras.

deserted. In its very centre, near the river, is planted a big squat fort, with thick walls of sun-baked bricks on massive foundations of stones and pebbles. Puini thinks that the fort of Dras was that seen by Desideri, some days after crossing the Zoji-la, in which lived the Mohammedan king of a petty state at the entrance to Ladak. But Desideri expressly says that the fort was on top of a high hill. This is one of the puzzles which make it difficult to identify with certainty the route which he followed.[1]

Cunningham says [2] that Dras is the Kashmir name, and that the Ladaki name is Hem-Babs, meaning "where falls the snow"; and it is true that Dras has the largest amount of precipitation in the whole trans-Himalayan region, due no doubt to the depression of the Zoji-la, which admits the moisture-laden winds from the south-west. Marinelli, Wood and Spranger, who crossed the Zoji-la at the end of April of the following year, found the Gumber valley and the whole Dras basin still covered with deep snow. As for us, in these days between September and October we had generally good weather and favourable to our work. We noticed that even at the head of this valley with its back to the Himalayas we could feel the periodic winds which blow every afternoon in Baltistan and Ladak. Sometimes, toward evening, the wind rose to a gale and a little snow fell on the heights; but in the basin itself there was no rain.

On October 8th we took up our march. Soon after our arrival at Dras we had begun sending loads on ahead; some to Leh, some to Skardu. Now, on leaving Dras, we dispatched to Srinagar on their way to Italy Dainelli's first cases of mineralogical specimens. With the rest of the baggage we hoped to be able to proceed, for we had not now one single superfluous item.

At the end of the plain of Dras the road passes two well-known monuments. These are two large stone pillars covered with bas-reliefs. Cunningham [3] thinks that they are Brahmin monuments, Francke Buddhist.[4] I mention them solely on account of a third and smaller block near by, with a relief of a warrior on horseback, which hardly anybody has mentioned, because, since nobody knows when, it had been lying on the ground. It did not escape Cunningham, who considers it a Sati monument, that is to say dedicated to a widow who burned herself on her husband's funeral pyre. We set it upright again, and thus for the first time a photograph of all three monuments could be taken.[5]

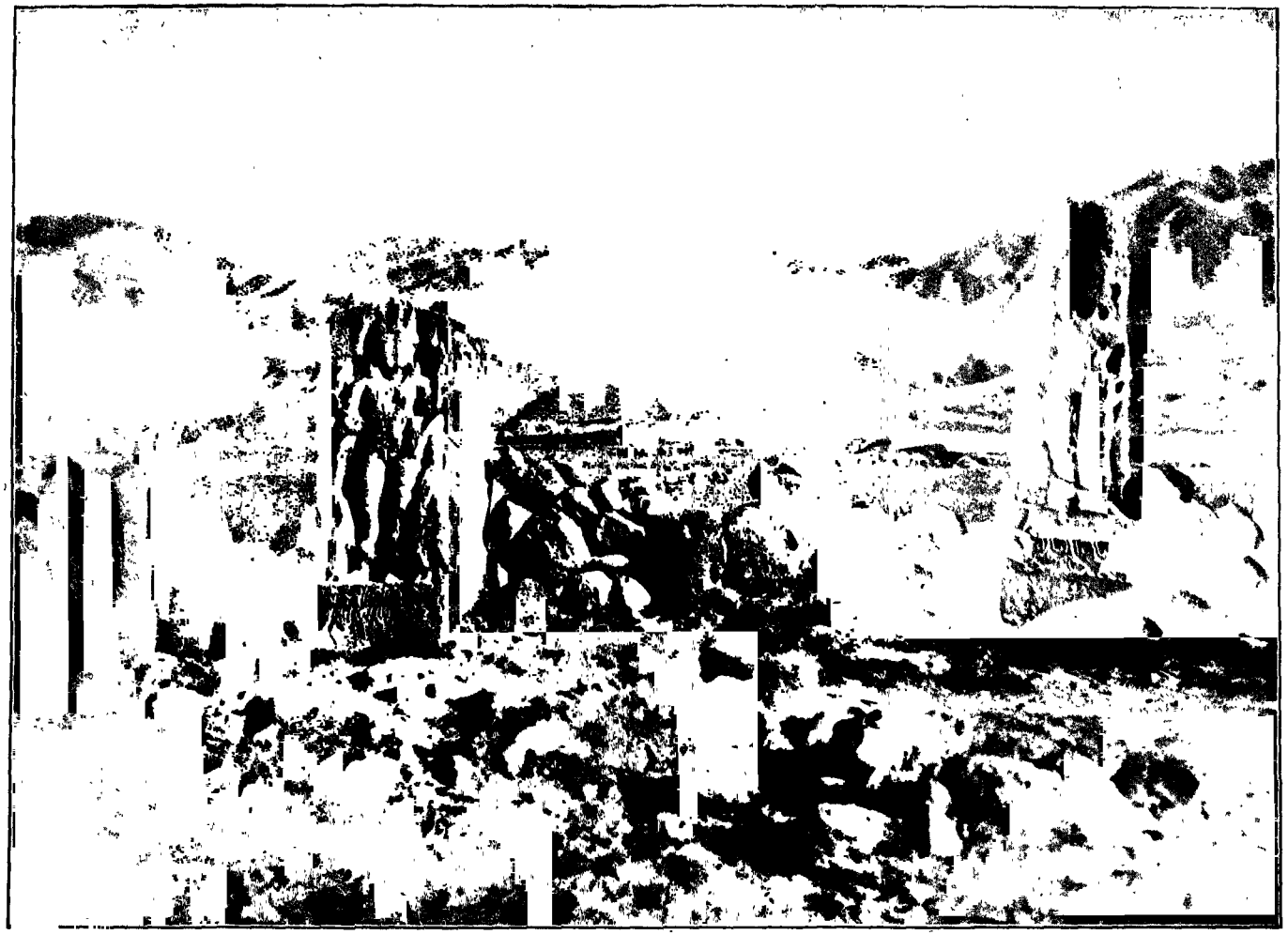
There was an unusual movement of caravans on the way; people were hurrying to get out of the mountains before the snows blocked the pass until May. We met an official coming from Kargil with his family, the wife borne in a palankeen with curtains

[1] See Puini, *op. cit.*, p. 27, text and note; and Desideri, ed. De Filippi, p. 378.

[2] A. Cunningham, *op. cit.*, p. 22. [3] A. Cunningham, *op. cit.*, pp. 381–2.

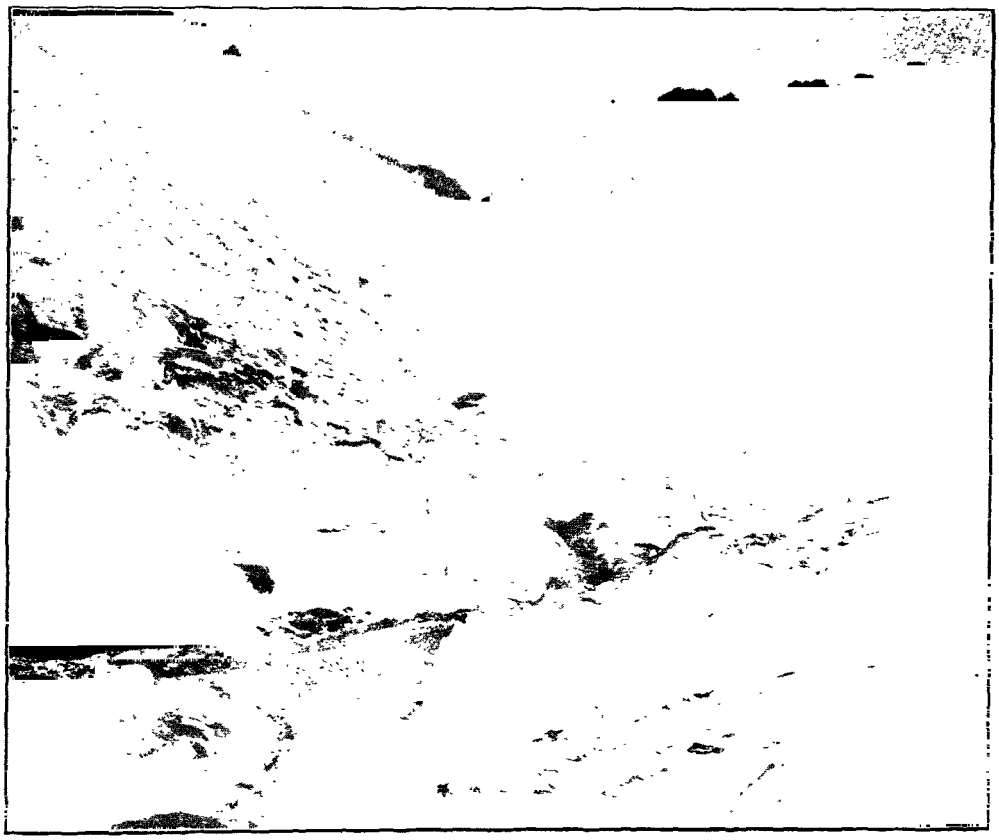
[4] A. H. Francke, *A History of Western Tibet*; London, 1907, p. 52.

[5] See the description and interpretation of this monument in A. H. Francke, *Antiquities of Indian Tibet*; Calcutta, 1914, Part I, p. 105.



Buddhist monuments near Dras.

tightly drawn. It tipped alarmingly every time the porters stumbled on the stony, narrow path. Further on was a red lama assiduously whirling his prayer-wheel. He was accompanied by two women and a servant, all on foot; we bestowed the ritual alms. At Karbu, 18 miles from Dras, we found Captain Gabriel, the British resident in Ladak, with Mrs. Gabriel, going down according to custom to pass



The Suru-Dras valley above Olting.

the winter at Srinagar. It was a fortunate encounter, for he gave us much useful information and advice on the subject of our spring journey from Leh to the Karakoram.

Leaving Karbu we reached next day the suspension bridge which marks the forking of the road: one route crosses the Dras and leads to Kargil, the other follows the left bank of the river directly to the Indus and Skardu. A little further down the Dras

falls into the Suru, a much larger river, fed by the vast glaciers of the Nun Kun chain, which traverses the whole Purig district.[1]

The road we have so far covered is the one built by Zorawar Singh for his armies of conquest; it is well marked and the going is smooth. Desideri gives an idea of what it was like in his time:

" the larger part of the way is on the sides of the highest and most frightful mountains; as a rule there is no room to walk save with the greatest caution and single file; in some places, the mountain being broken down, now by the weight of snow, now by the force of the waters, it comes about that the path is totally lacking." [2]

The two stages in the narrow, V-shaped Suru-Dras valley are more fatiguing than the preceding ones; the road goes up and down over steep spurs whose bases are washed by the river. The evening of the 10th we camped under the apricot-trees at Olting,[3] a big village grappled to the mountain slope near the mouth of the valley. The little terrace, hardly large enough for our tents, was a real belvedere. The view took in the whole length of the lower part of the Suru valley, with a fine background of glacier-covered mountains (D 64 and D 66 of the Indian Map).

Next morning betimes we emerged into the valley of the Indus, turning the spur between the two valleys at nearly 1,000 feet above the river. The lines of the landscape become all at once grandiose, the Indus valley opens spacious and imposing; but the effect is got largely by contrast with the deep gorge we had just left behind us. High walls of granite and metamorphic rock, cut by characteristic horizontal ledges of conglomerate and clay, scarcely leave room for the river—at this season flowing bright and limpid instead of muddy and sediment-laden as in the summer floods—and for its little sandy bays, that are strewn with sharp blocks of every size and shape, relics of

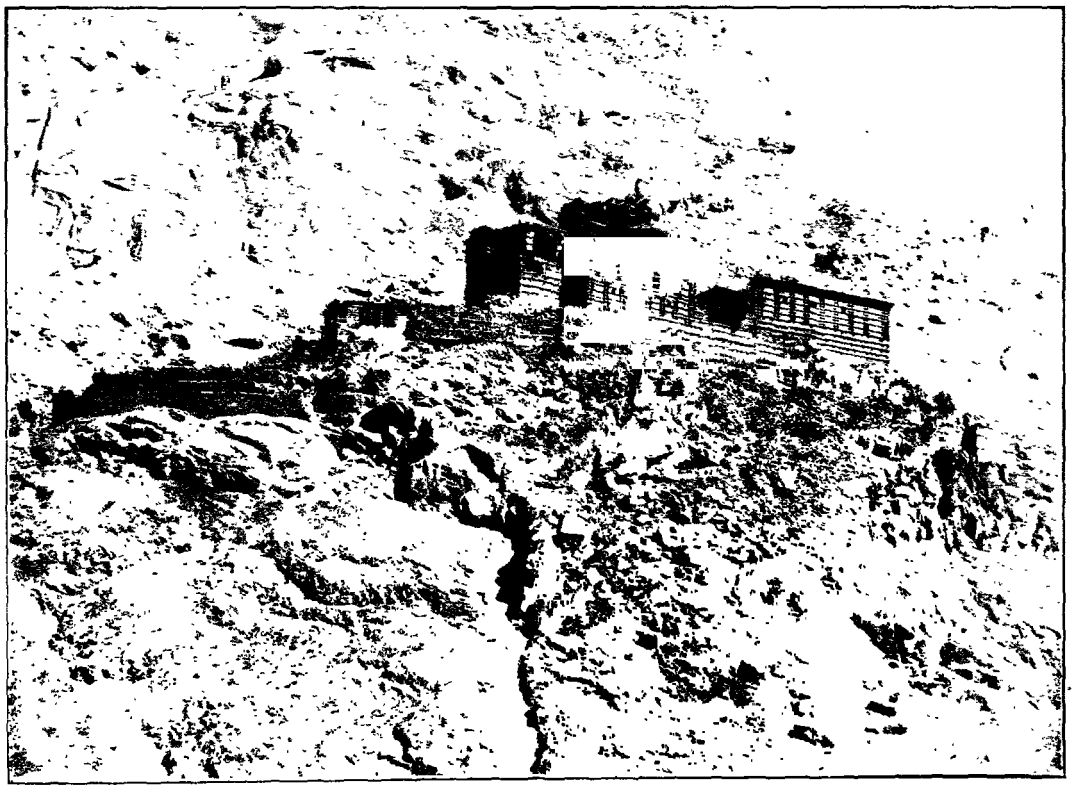
[1] There is no doubt that the Suru is the principal river and the Dras one of its tributaries; whence it follows that below the confluence the valley ought to be called Suru, or at least Suru-Dras. But almost all travellers call the valley the Dras, to the point where it issues into the Indus valley. Th. Thomson (*Western Himalaya and Tibet*; London, 1852, p. 237), calls the Suru Kargyl or Pashkyum, from the villages through which it passes; H. Strachey (*op. cit.*, p. 38) calls the Purig the Suru-Dras; Sven Hedin (*op. cit.*, Vol. I, p. 40) speaks of the confluence of the Dras with the Wakkha, which is only a minor tributary of the Suru, not much above Kargil. Bellew (*op. cit.*, p. 104) says that the river formed by the confluence of the Suru with the Pashkyum or Wakkha near Kargil is named Thangskam.

[2] Puini, *op. cit.*, p. 23; and Desideri, ed. De Filippi, p. 76.

[3] The map of the Trigonometrical Survey (scale 4 miles: 1 inch) has Olthingthang. And this, with the usual euphonic variations, is what our predecessors call the place; Vigne, *op. cit.*, p. 390, writes Yul-ding-Thung. But Dainelli, who, besides everything else, made diligent researches into the toponymy, was repeatedly told by the natives that the right name was Olting, and I have followed them, although no doubt what we have here is merely a case of the instability of local nomenclature, of which we have so many examples. Thang, indeed, means plain (the plain of Olting); thus, in Ladak, the Bazgo Thang, plateau between Saspul and Nimu (see Bellew, *op. cit.*, p. 127).

former landslides. A clump or so of junipers, some stray barberry bushes and *myricaria*, brier-patches with yellow-red foliage and a thick crop of brilliant red fruit, some tufts of *artemisia* with their beautiful flowery spikes and strong aromatic odour—such things spring here and there from the arid soil, like occasional happy thoughts. In some of the oases the second crop of maize and millet awaits the harvest.

The path was even better than it had been in 1909, and new tracks cut across the

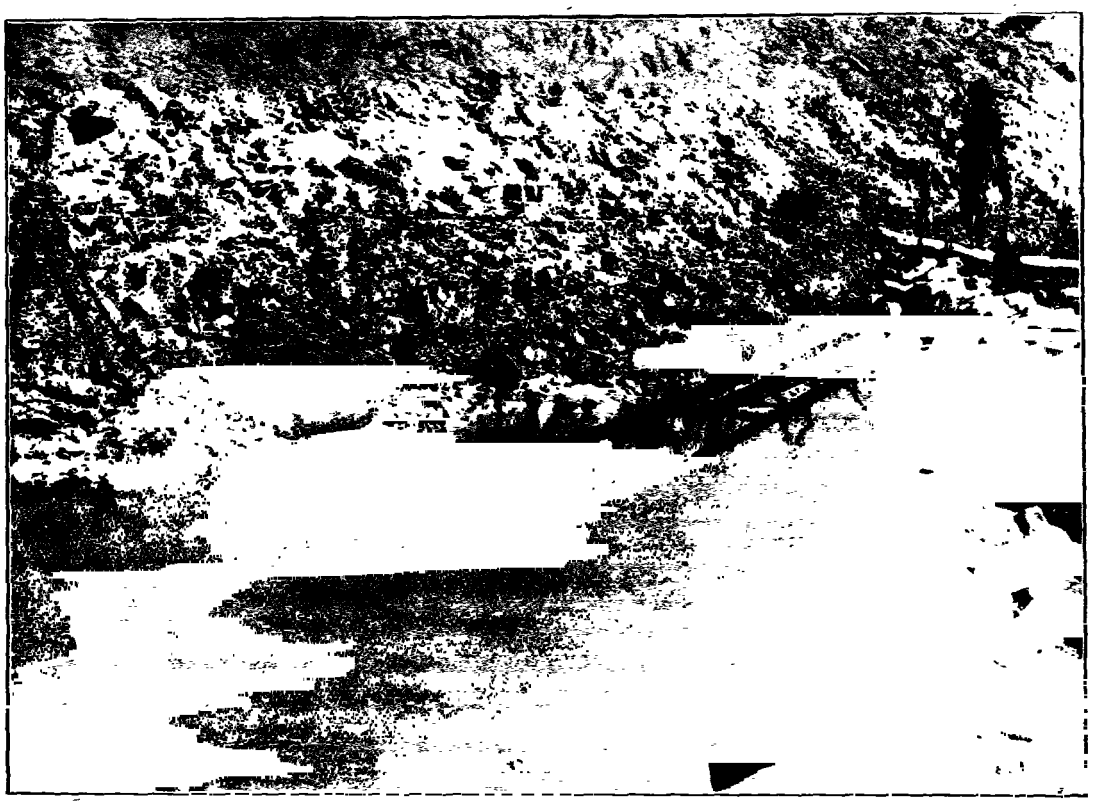


The old castle of Karmang.

rock saved us more than one *parri* (the wearying climb up the side spurs of the mountain). But from Dras onwards transport was scarcer and scarcer. To our few horses we added some *zho*—a cross between the yak and the common Indian cattle—and also we took on more porters, above a hundred in a few marches. Sometimes the escorting *chuprassi* (local police), the *lambardars* (mayors of the villages) and the *shikari* Abdullah spend a good part of the night in getting together the necessary men. Their cry is repeated from village to village, it re-echoes through the valley and summons porters even from great distances: good, willing fellows and hardy mountaineers. They

carry loads of from 70 to 90 pounds, and travel the rough, stony ways in footgear of plaited straw that gets worn out and is renewed every few hours. Like all mountain-folk, they delight in making the winding mountain passes ring with their full-throated cries.

Our second stage in the Indus valley was Karmang. We encamped on a narrow sandy flat on the left bank of the Indus, near a rest-house used by postal runners;



Jula bridge over the Indus at Karmang.

the settlement is on the other side, at the foot of a pointed rock which is crowned by a fine castle, abandoned but not yet in ruins. Across the river dangled a slender, swaying birch bridge or *jula*, probably the longest in all the district. It was formed by three parallel ropes of twisted withes, one to walk on, the others to hold with the hands. These primitive suspension bridges, mentioned as early as Desideri,[1] have been used for centuries all over the Himalayas, and in many other countries as well, varying in structure according to the plant used, whether climbers, cane, bamboo or birch.

[1] See Desideri's description in De Filippi's edition, p. 76.

In the afternoon we were visited by the son of the Rajah of Karmang, Ali Sher Khan. At one time each of the principal oases of Baltistan had its own dynasty of rulers, generally intermarried with the family of the Rajah of Skardu, though allied with him only against a common enemy. At the time of the Sikh conquest the grandfather of Ali Sher Khan sided with the invader, as we shall see, and thus preserved his little principality to himself and his successors. In the other oases the new rulers made new investitures.[1]

In the old days to reach Tolti from Karmang you had to surmount three high spurs and toil for twelve hours to get down 7 miles of valley; so that the better route was by crossing the Indus at Karmang and returning to the left bank by the bridge at Tolti.[2] But now there is a good level path cut along the left side, here and there supported by beams propped over against the vertical rock, that is lapped some 150 feet below by the swirling waters of the Indus.

The eldest son of the Rajah of Karmang.

Tolti was another place where we were to set up a geophysical station. It is a triangular oasis, filling the mouth of a narrow tributary valley; at the top of the triangle a polo ground lies across the gorge, and on this we set up our camp, the meteorological shed and later the magnetic station. Below, on the bank of the little torrent, was a small bungalow, large enough to house the gravimetric and photographic apparatus. Near by we set up the astronomical tent.

Hardly were we encamped, when we received a visit from the son of the Rajah, a fine child of perhaps 8 years, wrapped in a mantle of *pashmina* wool as in a toga, with a great white *pagri* (turban) on his head, and full of the serious dignity of his rank as a hereditary prince. Four years before he had been carried in a servant's arms to pay his respects to the Duke of the Abruzzi at Tarkutta. While we were at Tolti he came often to see us with the Rajah, his father; they were followed by half a dozen courtiers who, to tell the truth, were in nothing to be distinguished from the coolies, our porters. They generally brought presents of vegetables, fruit, melons, even a sheep and some pats of butter, rare commodities in these countries. It is considered good form to

[1] See in Cunningham (*op. cit.*, pp. 27–36) particulars of the old local dynasties and their traditions. The most notable was certainly that of Khapalu in the Shayok valley. It begins with Alexander the Great, followed by Abraham and Isaac, and records an unbroken series of 67 chiefs.

[2] Th. Thomson, *op. cit.*, p. 230; Roero di Cortanze, *op. cit.*, Vol. III, p. 4.

The Indus at Tolti.

accept part of the gifts, which one then repays with a suitable present, or else with a sum of money, on parting.

At Tolti we were met by Ghulam Hussein, formerly *waẓir* of Shigar, a rich oasis not far from Skardu. In 1909 he had been with the Duke of the Abruzzi on the Baltoro glacier. He was accompanied by a party of porters from his own district, and brought us three saddle horses and a profusion of gifts: cakes, shortbread, delicious apricots,

The Rajah of Tolti with his son and suite.

grapes, apples, melons, cucumbers, almonds, sultanas and nuts. He himself accompanied us as far as Skardu. The horses were a boon; they enabled us to send the government ones back to Srinagar with their grooms, before the pass closed. At Skardu we should have no need of them.

While Alessio, Abetti and Ginori carried on the work of the station, Dainelli made a complete survey of the oasis and its population; collecting data on caste, customs, dwellings, public and domestic economy, to illustrate the type of organization represented by these little social groups formed by the village oases of Baltistan. He also

began anthropological researches and measurements, and continued them through all the various populations we met with on our route, to investigate methodically once and for all the vexed question of the races that inhabit Baltistan and Ladak.

On October 23rd we finished our work and left Tolti, to make the last three stages of our march to Skardu. The Rajah came at dawn to wish us *bon voyage* and to help form the caravan. We had succeeded in getting together only fourteen horses and we needed 100 porters. The whole population had congregated in great numbers, but more to see the spectacle than because they wanted an engagement. They had to be persuaded, and here the Rajah's help was invaluable. He would seize the recalcitrants by the arms or even by the waist and conduct them by force to fetch the loads. But his violence was more apparent than real, and discussions and struggles always ended in a laugh.

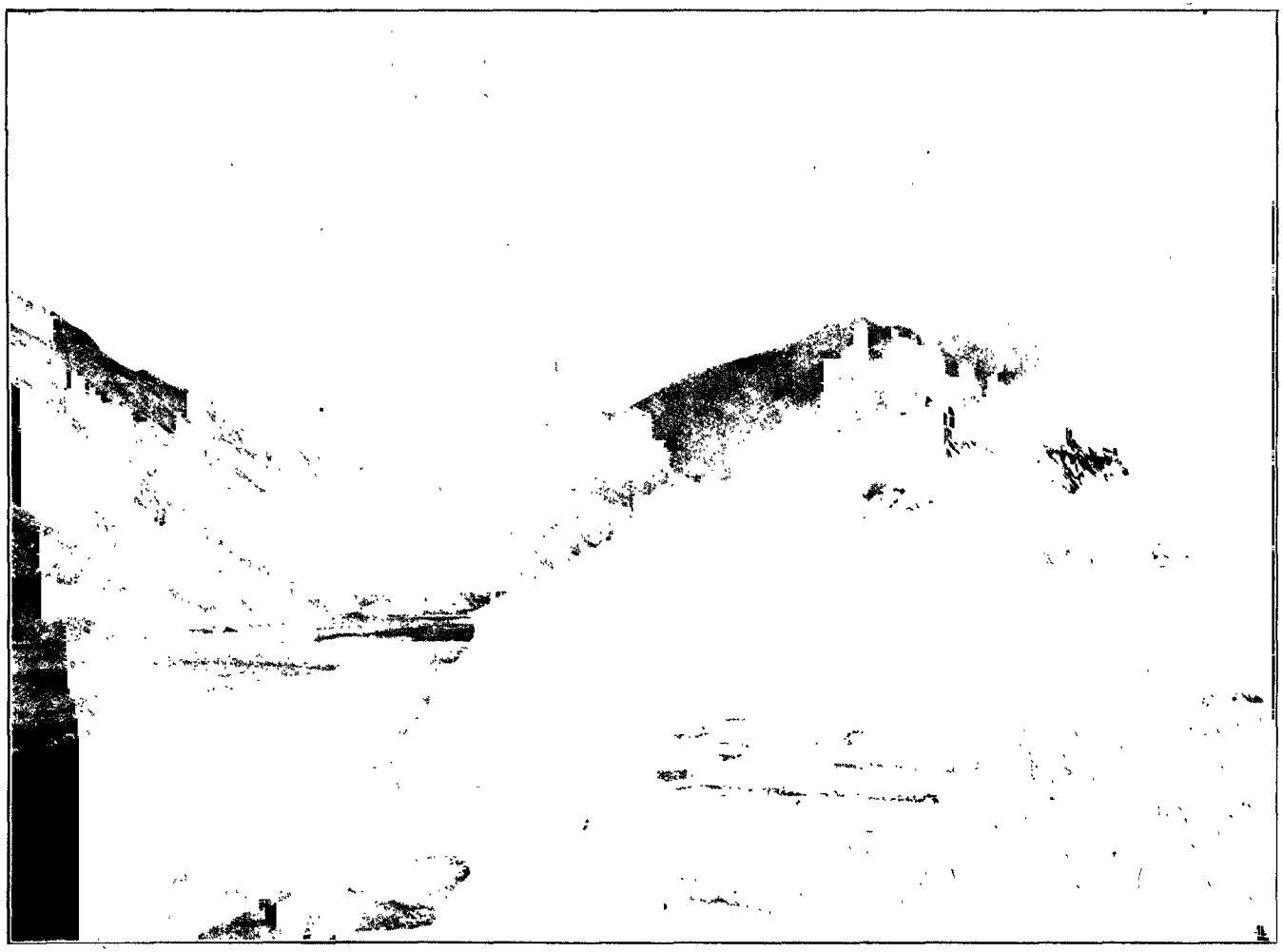
Beyond Tolti the oases become so much more frequent that at times they join, making long uninterrupted zones of vegetation between the foot of the mountains and the Indus; the path becomes a shaded avenue of poplars and willows. There is a moderate traffic of caravans: the produce of Baltistan is borne on the backs of men, that of Ladak on asses and *zho*.

We made the usual stage on the polo-ground at Parkutta, one of the most picturesque oases in the valley, cut in two by a ravine whence issues a tributary to the Indus. The village roosts on a lofty granite mass, with house against house and house above house. Parkutta is peculiar in being full of tombs, ancient and modern; some of the roofs are broken, and one gets glimpses of time-bleached bones.

Some 10 miles below Parkutta, in a wide intersection of valleys, is the meeting-place of the Shayok and the Indus. They are both of considerable size, and it is a question which is greater in volume; but the discussion is not of much value in the absence of any measurements of the depth and velocity of their currents. The same contradictory opinions, equally without foundation, are held of the Zanskar and the Indus, at their confluence in Ladak, and even of the Suru-Dras and the Indus. The right-hand corner between the Shayok and the Indus is entirely occupied by the large oasis of Kiris, which is connected with the left bank of the Indus by a ferry with a capacious flat-bottomed barge.

Followed another tract of open valley, between lower slopes, and then a defile where the valley, which so far had faced directly northwards, gradually curved toward the west. It issues in the vast basin of Skardu. The tops of the encircling mountains were covered with clouds; through the mist one got glimpses of the snow that sprinkled the slopes high up, leaving still exposed the bare rock up to 3,000 feet and more above the valley.

We passed through the low and narrow archway of a little customs fort; it stands



Parkutta.

astride the road, which runs along the high terrace, then for a space descends to the river bank, regaining the alluvial plain to join a poplar avenue which brought us shortly to the group of bungalows and the *serai* of Skardu.

It was the 25th of October. We had successfully completed the first stage of our journey.

CHAPTER III

WINTER IN SKARDU, THE CAPITAL OF BALTISTAN

Lodgings and laboratories of the expedition at Skardu—The station of Wazul Hadur and the station of Skardu—Baltistan in history—The Rock of Skardu and the Balti fort—Local grandees—Celebration of the Muharram—Feast of the Basant Panchmi—Buddhist monuments—Lake Satpor and its locks—The oasis of Shigar—Winter climate of Skardu—Organization of the campaign of 1914.

THE Skardu basin is a great alluvial plain, 7,500 feet above sea-level, some 18 miles long from south-east to north-west, and from two to five wide; enclosed by mountains which rise sudden, steep and bald to 10,000 feet above the valley, save in one spot, toward the north-east, where the tributary valley of the Shigar opens, very wide and flat. Two mountain spurs project into the basin and divide it into unequal parts joined by the neck of flat land between the two spurs; one of which, the lesser, advances from the mountains on the south, while the other, a prolongation of the left-hand chain of the Shigar valley, forms the eastern angle of the confluence of the Shigar and the Indus. The extremity of this spur is cut in two by the course of the Indus, so that there is left a great isolated rocky ridge on the left bank of the river, 1,200 feet high and perpendicular on the river-side. Behind it lie the oasis and village of Skardu.

The basin is crossed throughout its length by the winding course of the Indus, which has carved itself out a large bed, 50 to 70 feet deep, in the alluvial soil. It is already a river of considerable size, over 500 feet across, and six to ten deep even in winter. Below its meeting with the Shigar the Indus divides into several branches and runs

The Skardu basin.

among sandy islets—which likewise encumber the whole mouth of the Shigar. The Indus enters and leaves the basin by such narrow and tortuous gorges that the mountain barrier at either end of the plain does not appear to be broken at all.

Between the isolated rock on the left bank and the southern mountain wall of the basin lie, as I have already explained, the village and oasis of Skardu. A little above the settlement, separated from it by some small fields, stand the bungalows into which we settled for the winter. There were two of them, one the usual travellers' rest-house, furnished with a few broken chairs and tables and some *charpoys*, rectangular wooden frames on four legs, with tapes stretched across, on which one spreads the sleeping-bag. In two of the little rooms we put up four camp beds; the third, which rejoiced in a small fire-place, served for our dining-room.

The other building, 60 yards off, belonged to the Civil Engineers, whose work it is to inspect and to repair the roads. Dainelli and Antilli took it over, and made of it a photographic studio, with a dark room that left nothing to be desired. The second chamber served for study and work-room. Both buildings had been placed at our service by the governor of Kashmir, and we were to enjoy the like rent-free privilege in all the bungalows of Baltistan and Ladak, though a fixed charge for lodging is usual.

Close to the bungalows was the *serai*, composed of a group of little low buildings, each with from three to six small ground-floor rooms without furnishings. One was convenient for kitchen and larder, with a small sleeping-room for Petigax; another was devoted to the instruments and the gravimetric station; in others we stored the provisions and camp material and lodged the *shikari* and the servants. Caravan life being ended with our arrival at Skardu, the agent Alexander soon left us.

Ginori had installed the meteorological shed in the middle of a field, between the two bungalows; another little room close by housed the barometers and recording instruments. Skardu boasts a weather bureau, a little round-topped hut on a hillock near the telegraph office. The astronomical tent was put up near the second bungalow, with the radio receiving station a little farther down, in a field; the wire of the aerial ran for 200 yards among some clay ridges that separated us from the river and the meadows.

It was easy to adapt our quarters to the provisional needs they were to serve. The bungalows, like all those belonging to the government of Kashmir, were whitewashed and scrupulously clean. The little rooms in the *serai* we re-did in the local manner: some handfuls of dust, which is in fact the finest clay, are mixed in a bucket of water, and the wash put on the walls with a cloth; in no time at all they are tinted a pleasing uniform beige. The bare earth floor was re-covered with a new layer of clay, which was well watered and left to dry: after forty-eight hours you have a fairly hard, if a very dusty surface. For every need one goes back to the primitive sources: if we wanted boards for shelves or to mend the tables and chairs, we chose a suitable tree, had it chopped down and sawn up. And so with everything.

And as at Dras and Tolti, so here: our proceedings delighted the natives. They would pass whole days in curious observation of our incomprehensible goings-on; always discreet, always too far off to be in the way, squatted on their heels in straight rows, in a circle, or at a right angle two or three rows deep. We were a great popular success—like travelling jugglers in a village at home.

The geophysical programme of the expedition contemplated the completion of two stations not far apart in a horizontal line, but with the greatest possible difference of altitude. For this purpose we were to make two stations at Skardu, one at our winter quarters at the bottom of the valley, the other in a steep little valley that climbs up from Skardu to Burji-la,[1] a pass leading to the Deosai plateau. In this little valley is a level stony place, 1,800 feet below the saddle, called Wazul Hadur,[2] where caravans usually encamp on the way to the Deosai. This spot, some 6,500 feet above Skardu, we had chosen for our high station.

The season was already rather far advanced for carrying out such work at an altitude of over 15,000 feet. We decided to embark upon our task without delay, postponing operations at Skardu.

We made a preliminary excursion to the place, from the 2nd to the 5th of November. All of us went save Abetti, who stopped behind for the meteorological observations. A tree-bordered road leads from Skardu to the mouth of the little valley, which is like a narrow passage cut in the rock. Just beyond it are the remains of an uncemented stone wall, the relic of a barricade put up in the first half of the last century by Ahmed Shah, the last independent rajah of Skardu, against possible invasion from the Deosai route.[3]

A steep path mounts in narrow zigzags on the left slope of the gorge, to a flat terrace called Pindobal, about 11,100 feet above sea level, where we made camp, because it is the last place where there is water, also wood furnished by a thicket of juniper.

Next day we left the tents standing and continued to climb; from that point on there was not a vestige of vegetation. It had begun to snow in the night and went on all day. However, we reached Wazul Hadur without difficulty: it was almost 3,000 feet higher up, 15,770 feet above sea-level.[4] Wazul Hadur is a little amphitheatre at the foot of the final slope of the valley leading up to the Burji-la. As in all the stages in Baltistan, there are stretches of low stone wall, behind which the Baltis crouch for pro-

[1] Schlagintweit (*op. cit.*, Vol. III, p. 250) calls the pass Burze, the name of a little ligneous plant which grows at between 12,000 and 15,000 feet in Baltistan and Ladak. Neve (*op. cit.*, p. 74) gives it the name Burzil, which is another pass on the way between Srinagar and Astor. But the real name is Burji (Boorji on the Indian maps), the Balti word for the stone pyramids set up on the passes and crests to show direction when the snow has obliterated the path.

[2] Neve, *op. cit.*, p. 74, has Wazul Hadan.

[3] Described by Vigne (*op. cit.*, Vol. II, p. 243). It was then a wall of wood and stone, with loopholes, and a single opening for the stream or for men to pass.

[4] The altitude of the station is wrongly given as 15,571 in the Itinerary map.

tection from the wind. But there is no shelter worthy of the name. Months before we left Italy I had written to the Kashmir authorities to have a stone hut built with two little rooms for the gravimetric apparatus. But it had not been done; without the actual presence of a responsible person to give orders, no one in this country will undertake any kind of work. However, having foreseen that we might need to do our work in places devoid of shelter, I had devised and had made a large tent com-

View toward the north from Pindobal terrace in the valley of the Burji-la.

posed of three thicknesses of canvas walls with intervening spaces: the inside one black, the middle white, and the outside white lined with red; thus controlling within certain limits the variations of temperature inside it. At Wazul Hadur there was neither water nor fuel, nevertheless Alessio decided to attempt a station, by having the necessaries brought up by porters from Pindobal. We passed a second night in the tents at Pindobal and next day returned to Skardu.

In two days we prepared all the supplies for the high station: food, tents for the observers and their instruments; all the apparatus—gravimetric, astronomical, magnetic,

meteorological and aerological (this last for launching pilot balloons followed in their flight with the theodolite); the pyrheliometers for the measurement of solar radiation; and the photographic outfit.

On November 5th ten porters came from Shigar, brought by the ex-*waẓir*. They were old acquaintances who had served the Duke of the Abruzzi on the Baltoro, and I had asked them to undertake the work at Wazul Hadur, knowing that they would not desert us. The same evening, 80 coolies collected from the villages of the Skardu basin were sent forward with the *shikari* Hazra, to spend the night at the foot of the little valley and climb the next day to Wazul Hadur. These men remained only one day in the high valley of the Burji-la, and then returned to Skardu. Later, when the work was done, they went back to bring down the material.

On the morning of the 6th the European caravan left with the Shigar porters. Dainelli remained at Skardu, occupied with the geological and geographical exploration of the basin; and I kept him company, having undertaken to record during the absence of our companions the meteorological data at Skardu, both for the sake of maintaining the series of observations without interruption, and to serve as reference to those taken by Ginori in the high station.

The work at Wazul Hadur lasted ten days, from November 6th to 17th. Fortunately the storms which had raged on the mountains since our arrival at Skardu were over, and save for some brief intervals the weather was generally fair, with clear nights for the astronomical observations. But the intense cold must have rendered the work painful. The long hours spent motionless, watching the swinging of the gravimetric pendulums, or else gazing through a telescope, the delicate adjustment of the instruments, with the temperature nearly at zero and further aggravated by the wind,—all that must have required a constant effort of will on the part of the workers.

The weather by day was often cloudy, seriously hampering the measurement of the solar radiation; also some experiments with the pilot balloons went wrong. But it was the photography that suffered most from the atmospheric conditions. Antilli, besides working in the geophysical station, had intended to take by telephotography the distant range of the Karakoram from the high crest at the top of the valley. With this end in view he climbed to a peak east of the Burji-la, 16,595 feet high, and from that point made a telephotographic panorama of the mountains north of the Indus. The snowy chain was visible in all its splendour, but from the intervening valleys mounted columns of vapour, scarcely visible to the eye, but enough to veil and darken the view on the sensitive plate. Antilli returned a second time to the spot with his companions, who wanted to see for themselves the marvellous spectacle of that circle of giants.

Directly after the return of the Wazul Hadur party regular work began at Skardu: gravimetric observations alternated with geodetic operations; astronomical calculations of latitude and longitude; reception and recording of wireless time-signals transmitted from Lahore (received simultaneously by us and by the station at Dehra

Dun); measurement of a base and triangulation of the basin, determination of the absolute value of the magnetic elements and their daily variation, etc.

All this proceeded with the same method and regularity as in any geodetic and geophysical station in Europe. Yet now and then we were conscious of the singularity of the place and our remoteness from the civilized world. As when, having awaited in vain for two evenings the time-signals from the wireless, there having been a misunderstanding about the date of transmission, we heard, for the first time, faint but clear, the rhythmic notes coming to this remote valley all the way from Lahore, after crossing the Himalayas and many a secondary range. These sounds coming across space from other men of our own race, appealed at first more to the emotional than to the scientific side of our minds.

We stayed at Skardu for over three months and a half. The only other European traveller to winter there before us, so far as I know, was Dr. Thomson, in 1846–47.[1] Before him, not counting a brief visit by Henderson in 1835, only Vigne had reached Skardu: he was there three times between 1835 and 1838, at the invitation of Ahmed Shah, the last independent sovereign, already threatened by the ambitions of the Sikhs, who were eager to add the conquest of Baltistan to that of Ladak.

Of the remote history of Baltistan we have but few and fragmentary notices. Vigne refers to the tradition of a famous manuscript, destroyed in the burning of the castle of Skardu, in the reign of Zufur Khan. In may have contained the chronicles of the Gyalpo, or kings of Skardu.[2] For Baltistan, at least in later centuries, was not really a nation, although some of the kings of Skardu succeeded from time to time in impressing their sovereignty on the rulers of the neighbouring petty states, even beyond the confines of Baltistan. But these were sovereignties of brief duration, and probably less like conquests than border raids.

And yet this remote little nook, shut away among inaccessible mountains for the greater part of the year, was nevertheless known to the most ancient geographers. These people are the *Byltae* of Ptolemy,[3] who, according to local tradition alive even to-day, were Dard in origin. Ujfalvy will have it that the Baltis are descendants of those ancient *Saci*, driven southwards by the pressure of the Mongol hordes in the second century of our era, and mingled with the Dards and Tibetans.[4] Theories about the origin of the Baltis are closely bound up with those about their race. Unfortunately there is no consensus of opinion among authorities.[5] No one but Ujfalvy had up to

[1] There should be mentioned, however, the Swedish missionary Gustavson, who lived some years at Shigar, near Skardu.

[2] Vigne, *op. cit.*, Vol. II, p. 253. J. Biddulph (*Tribes of the Hindoo Koosh*; Calcutta, 1880, p. 144) mentions a chronicle of the Makhpons, or kings, destroyed when the Sikhs took Skardu in 1840.

[3] See A. de Humboldt, *Asie Centrale, Recherches sur les Chaînes de Montagnes et la Climatologie Comparée*; Paris, 1843, Vol. I, p. 157; and Cunningham, *op. cit.*, p. 34.

[4] Ch. de Ujfalvy, *Les Ariens au Nord et au Sud de l'Hindou-Kouch*; Paris, 1896, pp. 217, 327. Also Puini, *op. cit.*, p. 22.

[5] F. De Filippi, *Karakoram*, pp. 105–11.

now collected any anthropological measurements.[1] Dainelli has completed researches on a much broader scale, with data gathered among all the populations of Baltistan and Ladak; these form the subject of a monograph by Professor Biasutti in Series II, Vol. IX of the Scientific Reports, and will be sufficient to settle the question once and for all.

The earliest historic date we have for Baltistan occurs in the Chinese annals, where there is mention of a Chinese military expedition in aid of Ladak against Tibet, in A.D. 747. Ladak and Baltistan are called Big and Little Poliu. The king of the latter lived in a city named Nieito, near a river named Soi (perhaps the Shayok).[2]

After an interval of eight centuries, Baltistan reappears in a history of the doings of Sultan Said, a Mongol khan of Kashgar, related by his general Mirza Muhammed Haidar, in the Tarik-i-Rashidi (Annals of Rashid).[3] Said invaded Ladak in the spring of 1531, and managed to traverse the Karakoram pass, the Sassir and the Nubra valley, with an army of 5,000 men—an almost unbelievable feat. For more than two years he lived by robbery and pillage in Ladak and Baltistan, thrusting as far as Kashmir over the Zoji-la, as we saw in the second chapter. Sultan Said died in the second year, on the Karakoram route, while his son Iskander and Mirza Haidar were attempting nothing less than the conquest of Lhasa, the capital of Tibet proper. After two months they were forced to retreat, their army decimated by the height, the cold and the privations it suffered. When the third winter approached (1533) and Mirza Haidar and Iskander decided to leave the country, their train was reduced by death and desertions, to 27 men. Kashgar had been closed to them by the death of Sultan Said and ensuing political changes, and they repaired to Badakshan, whence Mirza Haidar returned to Kashmir to write his history.[4]

Baltistan appears to have made a rapid recovery from the devastation due to the invaders from Kashgar; for a little more than 50 years later the king of Skardu, Ali Sher Khan, between 1590 and 1610, conquered Ladak and Khapalu, in the district of the Shayok. From this point on, the history of Skardu is interwoven with that of Ladak, from whose chronicles it can be reconstructed. Ahmed Shah, the last king, related to Vigne the history of his predecessors from Ali Sher on[5]: a series of struggles, attended by varying success, with neighbouring chiefs and with Ladak.

At the time of Vigne the little kingdom was near its setting. In a succession of campaigns between 1834 and 1840 Zorawar Singh and his Sikh army had conquered Ladak for his liege lord Gulab Singh, first Maharajah of Kashmir; a pretext for attacking

[1] Ch. De Ujfalvy, *op. cit.*, and *Aus dem westlichen Himalaya*; Leipsic, 1884.

[2] See the note on p. 71, Vol. I, *Cathay and the Way Thither*, by Sir Henry Yule; ed. Henry Cordier, The Hakluyt Society, London, 1915–16.

[3] *A History of the Moghuls of Central Asia.* The Tarik-i-Rashidi of Mirza Muhammed Haidar, Dughlat. An English version, edited with commentary, notes and maps, by N. Elias. Translated by E. Denison Ross; London, Low (1895).

[4] See Bellew, *op. cit.*, pp. 95–8, also his chapter in Sir T. D. Forsyth, *Report of a Mission to Yarkund in 1873*; Calcutta Foreign Dept. Press, 1875, pp. 171–3.

[5] See Vigne, *op. cit.*, Vol. II, pp. 252–4. Also, in Cunningham (*op. cit.*, pp. 29–37) the genealogies of the chiefs of the various districts of Baltistan, from the 15th century on, based on local traditions.

Baltistan was not hard to find. It was furnished by the quarrel between Ahmed Shah and his first-born son Mohammed Shah, whom he had cut off from the succession.[1] Zorawar Singh espoused the cause of the deposed heir, and invaded Baltistan toward the end of 1840 with an army of 15,000 men. Some of the Ladakis fought on his side, others who had remained faithful to the old regime joined Ahmed Shah. But the climate itself was the best ally of the king of Skardu; the Indus too, was unfordable, and its bridges broken; altogether the expedition came near to ending in disaster. An early winter found the Sikh army still on the right bank; hunger and cold soon made their position critical. Many of them lost hands or feet through frost-bite. A column of men sent up toward Shigar from Khapalu in the Shayok valley fell into an ambush, and of 5,000 men it is said that only 400 survived. But at last the army succeeded in crossing the Indus on the ice. They surprised and routed the Balti defenders. Ahmed Shah took refuge in the fortress of Skardu, but was soon obliged to surrender. His son Mohammed was set upon his father's throne; but of course the little country lost its independence for ever. Ahmed Shah and his favourite second son, at the head of a contingent of Balti soldiers, had to follow Zorawar Singh when he set out to conquer Tibet—an expedition which ended disastrously with the slaughter of the leader and the destruction of his army. Ahmed with his son was captured by the Tibetans and ended his days at Lhasa, where he was treated with respect and kindness.[2] With the accession of Gulab Singh as Maharajah of Jammu and Kashmir, Skardu became the official capital of Baltistan, which, with Ladak, was added to the new kingdom (1846).

The village of Skardu[3] lies beneath and a few hundred yards away from the bungalows. The path runs at the foot of a natural bank, formed by a rise in the alluvial terrace along the Indus, crossed from time to time by ancient torrential beds. At the western end this bank ends in an elevation surmounted by the ruins of an ancient fort.[4] Here a stream flows into the Indus by a little wooded valley; the trees hide a small Hindu temple with a white marble monolith in the centre, the *lingam* of Siva. There are some bronze vessels near by for the offerings of water and the fruits of the earth. At the sides of the little temple are two square tanks into which flows the water from two springs. On the left bank of this small valley is a square fort built

[1] Rev. A. H. Francke, *History of Western Tibet*, p. 154.

[2] Neve (*op. cit.*, pp. 249–53), Francke (*History*, etc., p. 154–60) and Cunningham (*op. cit.*, pp. 347–9) give the story of the Dogra conquest with few variations. Cunningham had it from the lips of Mehta Basti Ram, one of Zorawar's officers, who followed him all through the campaign.

[3] According to Thomson (*op. cit.*, p. 216) the name of the place is Skardo or Kardo. The Mohammedans, who cannot pronounce initial *s* followed by a consonant, say Iskardo. Cunningham (*op. cit.*, p. 34) calls it Skar-mDo, which means place, or fort in the form of a star; or Skar-ma-mDo, enclosed place. Moorcroft (*op. cit.*, p. 262) has Sagarkhoad; Vigne too (*op. cit.*, Vol. II, p. 249) Sagar-khoard or Skarkod, and derives it from two words, one Sanscrit and one Persian. But Cunningham (p. 34) observes that in Tibetan Skar-hGod means the same as Skar-mDo, i.e. a star-shaped building.

[4] None of our predecessors appear to mention this fort, and nobody at Skardu could tell me its history. It seems to be older than the castle on the rock of Skardu.

of unbaked bricks, with squat towers at the corners. Here the little Dogra garrison is quartered: a hundred soldiers in clean khaki uniforms, commanded by a junior officer or *subhadar*. Beside the fort is a magnificent plane-tree, sole representative of the *chenars* of Kashmir: it is the last of a group planted by Ali Sher Khan over three centuries ago. Close by is a clump of attenuated and weedy poplars, which seem to have been put there to afford a contrast with the plane-tree's ample majesty. Behind them is a small mosque which holds the tombs of Ali Sher and his five successors.

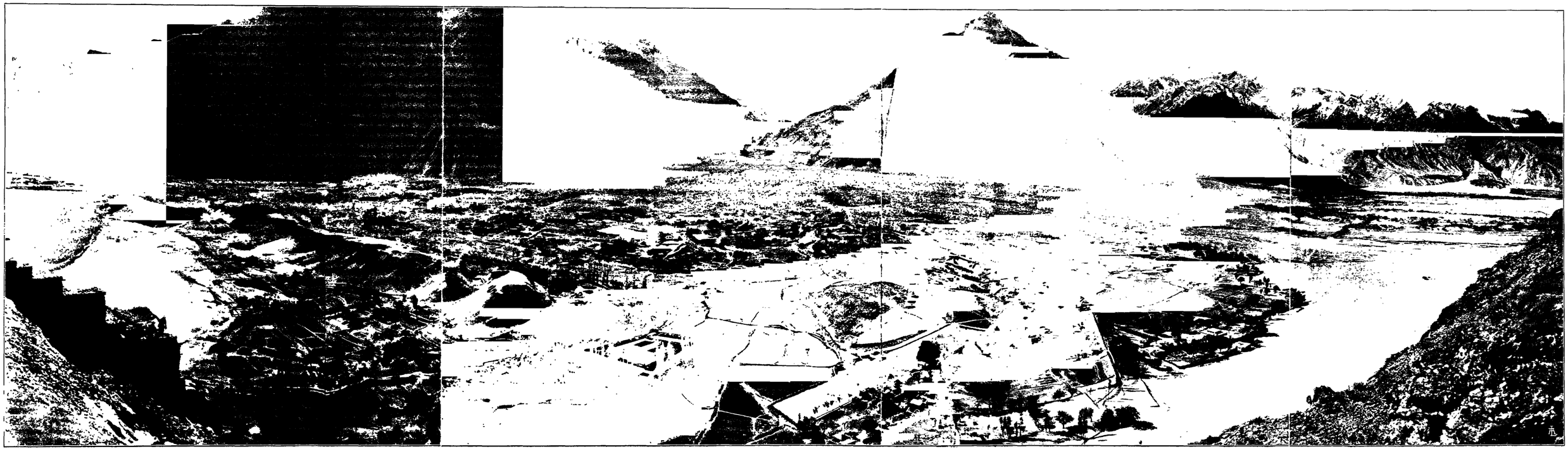
The path goes on past a little group of buildings: the post-office, the school, the medical dispensary—this last a recent institution. It leaves the polo-field on the right, and a bald, sandy rise of ground scattered with ancient half-uncovered tombs, and topped by a round hut which holds the meteorological station; then it climbs a high rampart with a stonework foundation, that carries the ancient aqueduct, some 2 miles long, built by Ali Sher. This aqueduct still brings drinking water from the stream at Satpor down to Skardu. Directly behind this dike, nestling between it and the isolated rock I have mentioned above, is the settlement of Skardu.

The rock of Skardu.

The capital city of Baltistan is not much to look at. It has one single street, the market or bazaar, flanked by shops with a single storey above. In the summer months a trader or so comes from Kashmir or Leh, and business is a little brisker. This is the dull season: only half a dozen shops are open, with a few bales of cotton stuff piled in the background, and three or four men squatting Turk-fashion round the hookah, on a *namdah* or felt rug from Yarkand. They pass each other the mouth-piece in turn, not touching it with the lips but drowsily inhaling the fumes through the hand curved in the shape of a tube. You see other figures crouched in the sunny corners about the street. A babu with a pile of books beside him sits in a shop piled with bags of grain and dried fruit giving a reading lesson to a boy: they read together in a loud drone which only adds point to the silence. Everything seems to have slept for ages. This is a Mohammedan country, not a woman is to be seen, nor any sign of the life which must be stirring on behind these mute and silent house-fronts.

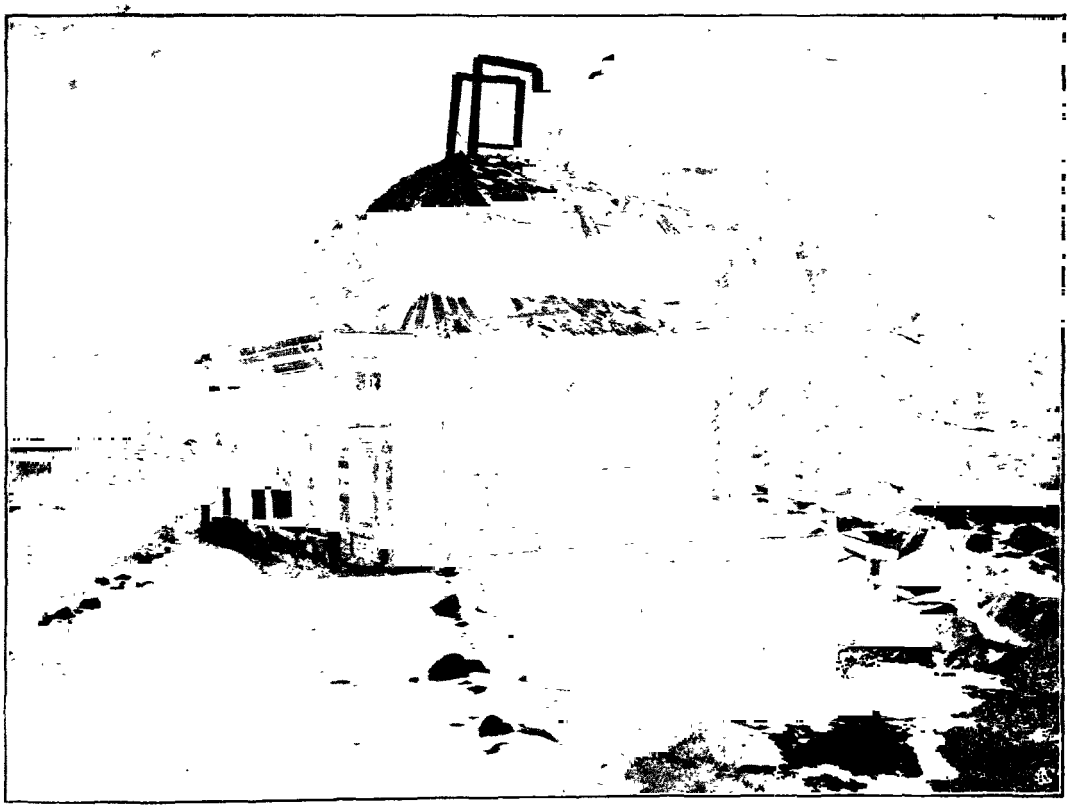
Above the village, so steep as to seem almost perpendicular, towers the wall of the rock of Skardu. It is a cliff 1,200 feet high, more than 2 miles long, running east and west on the left bank of the Indus, which bathes its foot on the northern side. On its eastern corner, some 300 feet above the valley, the rock is broken into by two plat-

Satpor Valley



THE OASIS OF SKARDU

forms or terraces one above the other, which support a fortress so imposing as to be out of all proportion to the wretched little town at its feet which it was intended to defend. Like everything else in Skardu, it was built by Ali Sher Khan, at the beginning of the 17th century. We were allowed to visit it only after getting special permission from the government of Kashmir. The ascent is by a narrow path cut in the rock—provided with defensive works—which leads into the fort by a great vaulted passage, guarded



Mosque inside the fort of Skardu.

by a single sentinel who constitutes the entire garrison of the castle. The building stands on a foundation of granite blocks, on which rise walls solidly built of stones joined by wooden beams. On one side of the entrance is the old guard-room, where a dozen ancient culverins stand mounted on their carriages.[1] On the upper terrace is an open space with a row of little low rooms built along the outer wall, doorless, and long since deserted. On one side is a tumble-down mosque, its architectural lines all

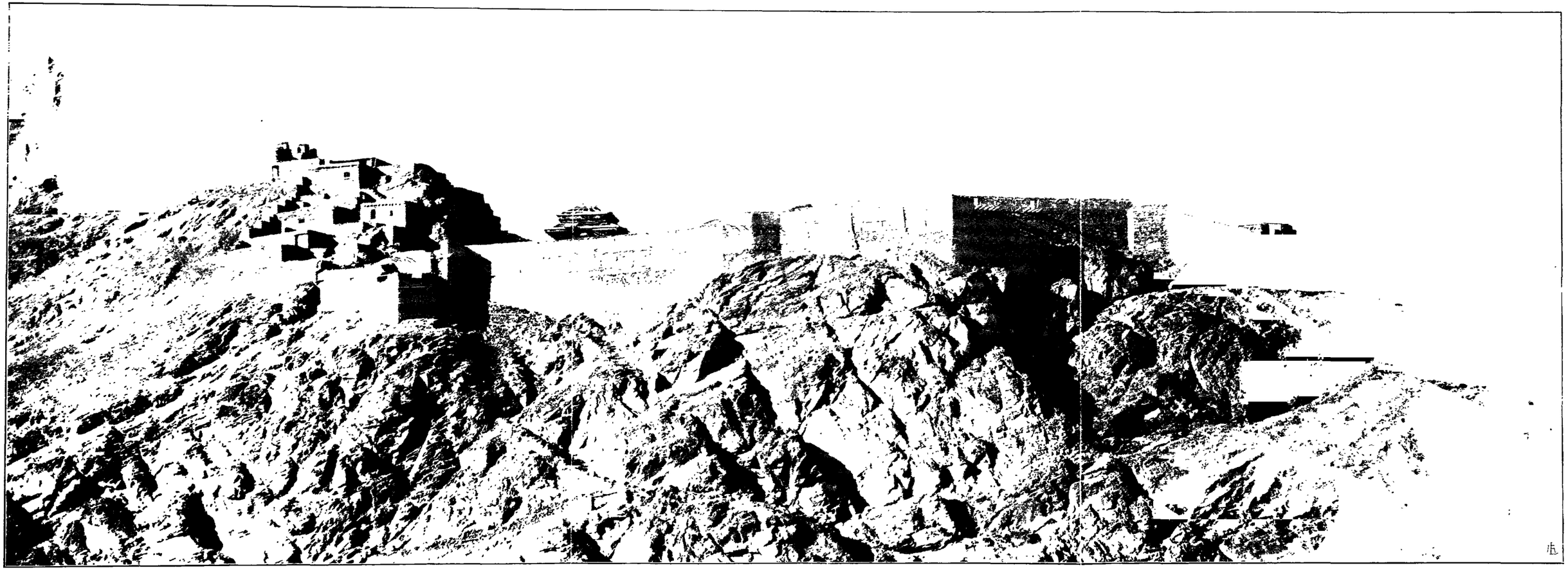
[1] Vigne (*op. cit.*, Vol. II, p. 252) says that the castle was once besieged by the troops of the Emperor Aurangzeb, who intervened to compose a quarrel between two sons of Ali Sher Khan; and that cannon and arms left behind by the Moghul army are still in the castle. Perhaps he refers to these very culverins.

but unrecognizable. Behind the terrace on the mountain-side is a spur of rock some 60 feet high, covered with little single-room houses built one above another. At the very top is a *maẓar* or tomb of a holy man; inside it are the usual poles hung with strips of red and white stuff. The castle was the last refuge of Ahmed Shah and his men—here for a little while they sustained the siege of Zorawar Singh's troops. Their surrender, according to some accounts, was due to lack of water; but others say that the Dogra troops got possession of the crest above the fort and so had it at their mercy.

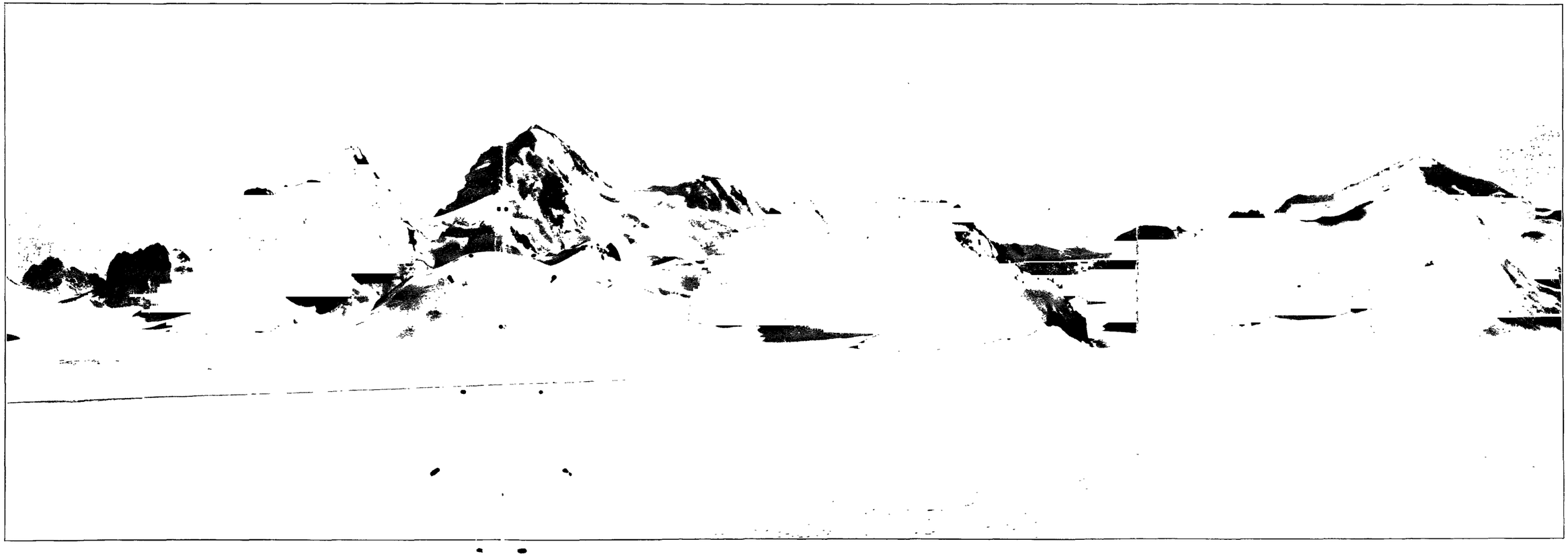
The fort does not give access to the top of the rock; this you reach by an easy path along the western end. The summit is a long billowy crest, broken toward the east by a deep cutting, on the farther side of which a low battlemented wall bestrides the ridge, set there to defend the rear of the castle below. The rock, lying as it does in the centre of the Skardu basin, directly opposite the spot where the great Shigar valley opens out, affords from its summit a magnificent view over the whole landscape, up to the great glacier-covered ranges, outlying spurs of the Karakoram, which bound it on the north.

Southward, at the foot of the rock, stretches the oasis of Skardu: neat, geometrical, fresh-ploughed little brown fields, edged by rows of poplar, willow and apricot trees, and defined by a network of innumerable little ditches and canals fed by the Satpor and the Burji. Here and there among the fields are dusty, uncultivated patches, strewn with ancient abandoned tombs, scarcely noticeable except for the low rectangular border of hardened mud. In some of the better-preserved tombs a second little clay rectangle rises in the centre, upon which wavy lines were traced with a stick before it got hard. Sometimes the little rectangle is made of wood, perhaps to symbolize a door; here and there one sees tombs with an actual rectangular wall. Many are uncovered, exposing the cavity plastered with dry mud, sometimes lined with stone; the badly joined vault is made of stone as well. Or there may be the tomb of a holy man, a little structure with roof spreading to form a verandah, surrounded by poles hung with coloured rags. But there is nothing of any size or importance.

Scattered through the oasis are the peasant houses, one- or two-storeyed, built of sun-dried bricks in wooden frames, upon uncemented stone foundations. They have latticed windows, the little squares of which are closed with paper, or sometimes with mica. The flat roofs are covered with beaten earth. At this time of the year the whole landscape is devoid of verdure; dry leaves fall one by one from the trees and are diligently harvested by the wretched calves, goats, heifers and sheep that wander along the ditches and through the arid fields. In October we saw flocks of goats gather about some tree, and wait with quivering muzzles while a peasant in the branches beat down the yellow leaves for them to eat. Even these trees were soon bare, and the wretched animals came prowling round our quarters for a pittance. Fruit parings, the straw or shavings from a packing-case—everything would vanish in an instant.



BALTI FORTRESS ON THE ROCK OF SKARDU



RANGE TO THE RIGHT OF NORTHERN RIMU, DIVIDING IT FROM THE MAIN RIMU GLACIER

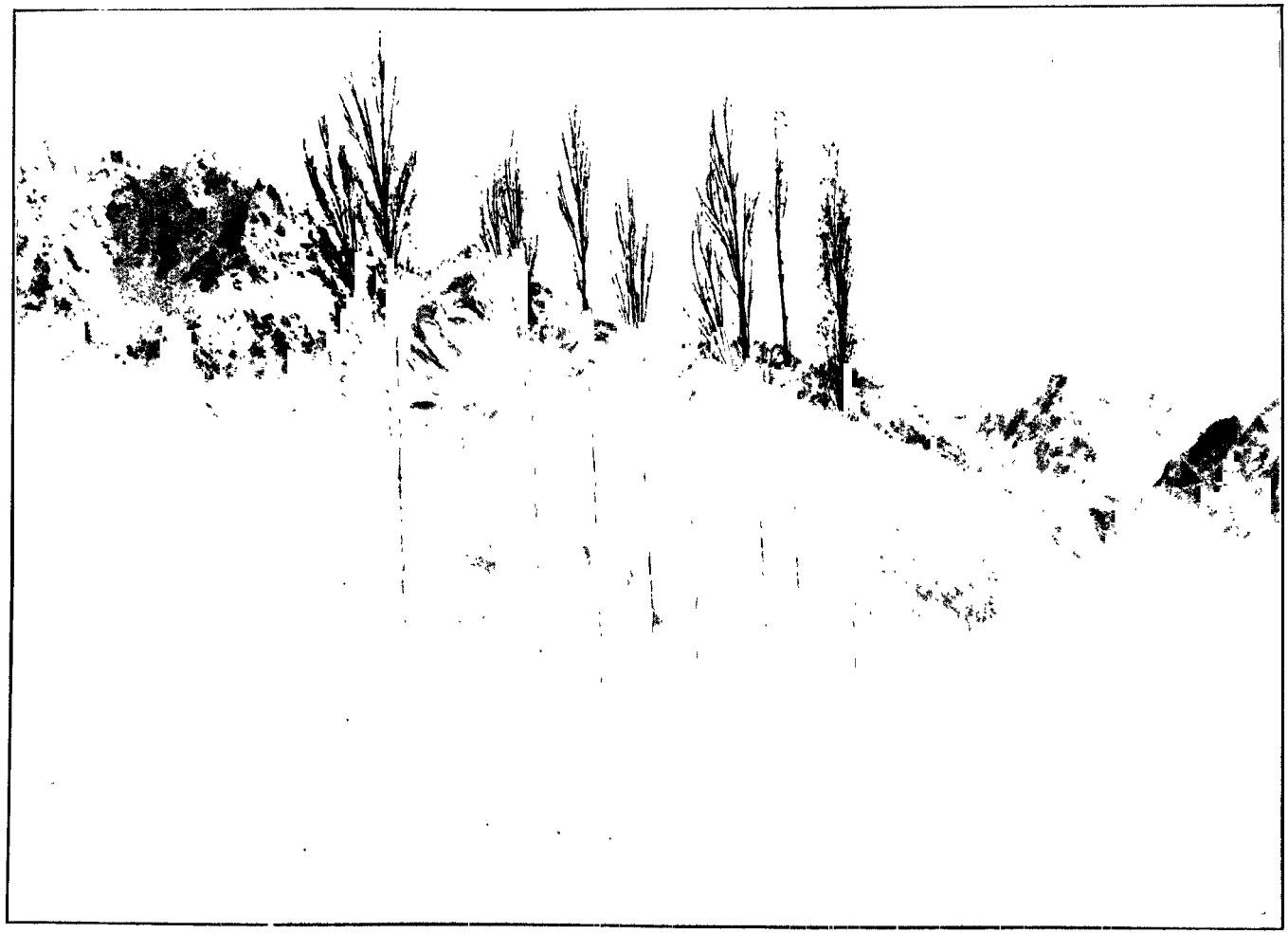
It was pathetic to see a calf, so weak that it could barely stand, slowly gathering into its mouth yards and yards of chronograph tape.

As for dogs, there were a dozen of them in the oasis, including a pair of large Afghan greyhounds belonging to the Rajah. The famished creatures came round our bungalows and laid siege to us night and day from the first; we had to close up very carefully every evening to prevent them from thieving. One night they dragged a sack of flour into the space before the bungalows, leaving a great trail of it the whole way. Dogs, goats and calves licked up the unexpected treasure-trove all next day, when only a few grains remained for the hens to pick.

Of wild life I saw none in the oasis, save some big crows. There were no magpies, and I wondered why, for they are plentiful everywhere else on the upper Indus, in the oases and the open country alike. But there was a good deal of game round about; driven down, no doubt, by the snow on the Deosai plateau. The shrubbery at the base of the mountains harboured hares and partridges, and we saw ibex in the valley of the Burji-la. Two or three miles below the village and the rock there is a great marsh, formed by the waters of the Satpor and the Burji; it is the resort of hosts of water-birds: various kinds of wild duck, teal, a species of ashen-grey heron, and a few wild geese. We went there sometimes to shoot, but not often, owing to the exacting nature of the work at the station.

But other kinds of diversion we could arrange for, and did, nearer home. Chief among these was ice skating. I had a large basin built with a rim 5 feet high, and ditches for the inlet and outlet of the water, in order to be able to renew it underneath the sheet of ice; built, in short, according to all the rules. By December 20th the ice was thick enough to bear us, and lasted until February 14th, when it was spoiled by a thaw. If I had known to what complications this enterprise would give rise I should never have embarked upon it. I was not aware that after the autumn work all the water is drawn from the ditches and canals, to prevent them from becoming choked with ice and inundating the fields, forming a crust which would seriously delay operations in the spring. I was very careful to keep my supply ditch free from ice and the rim of the basin in good repair; but at first we could not persuade the Baltis to let the water run; they insisted on closing the switch above at night, and we had to keep dashing up to open it. At length, after unavailing persuasion through the *shikari*, I applied to the *tehsildar*, who accordingly appeared next day at the bungalow, with four soldiers escorting the supposed culprit, a wretched peasant weighed down with enormous chains on wrists and ankles. We had a regular trial in the porch of the little bungalow, with witnesses and counsel for the prosecution and the defence. It all ended with my promise to reimburse the peasants for any damage done to their fields, and theirs to let us enjoy our recreation unmolested; after which the culprit was bade to go in peace.

We had very pleasant social relations with the little group of officials at Skardu. The chief of these was Hashmatullah Khan, governor-general or *waẓir-i-waẓarat* of



Autumn in the oasis of Skardu.

14274

Ladak and Baltistan; whom we had already met as we descended the Zoji-la toward Dras. On November 5th he arrived at Skardu to spend the winter, and was received with great ceremony; the Rajah came to meet him with a numerous suite, the *tehsildar* with a drum corps, and a detachment of soldiers came carrying a small cannon, which they set up near the *tehsildar's* house and fired a salute of five rounds. Hashmatullah Khan is a Mohammedan, a man of culture and intelligence, with a kindly open face not lacking in delicacy. He seemed the personification of officialdom, with his spectacles, and his rather bulky body buttoned up to the chin in a close-fitting long black garment. But his energy, his physical activity, his endurance amid the strains and fatigues of the long hard journeys he took, are surely uncommon among bureaucrats of any country, and particularly those born and bred in the Indian plain. He went with Dainelli on nearly all the excursions the latter made that winter in Baltistan; performing his duties of inspection and investigation and conscientiously receiving the petitions and complaints of the natives. To our expedition he was truly a special providence; without his authority and personal interest I do not know how we should have overcome the difficulties of organization and supply, of which I shall shortly speak.

The *waẓir-i-waẓarat* lived at the house of the *tehsildar* or prefect of Skardu, Ram Gopal Mehta, who also came from Jammu, but was a Hindu, and to outward eye the antithesis of the *waẓir*; being rather agile physically, smooth-shaven save for his moustache, and dressing with bizarre elegance in a mixture of English and Indian styles: as for instance in a dark blue or violet tailcoat with a fancy waistcoat beneath which a ruffled shirt flowed down Indian fashion upon chequered or nut-coloured trousers and leather leggings. A huge pale pink turban completed the picture. He had a large family—seven small sons, I think—and lived in a spacious and beautiful house well furnished in European style, surrounded by gardens and a fine orchard. But like all Indians from the plains, he bore ill his exile to the cold climate and the narrow horizons of these "frightful mountains"; he was not the first official who had begged me for recommendations and a medical certificate to strengthen his request to be transferred to a milder climate nearer the sea-level. He too exerted himself in every possible way in the service of the expedition.

By good fortune, neither the *waẓir* nor the *tehsildar* was hampered by caste restrictions—or perhaps, in this remote and barbarous place they had set them aside; with the result that our relations were more familiar and cordial. More than one pleasant evening did we pass together, either round the table at the bungalow or experimenting with Hindu, Balti and Ladaki cookery at the house of the *tehsildar*. The party was completed by Thakur Singh, the settlement officer, and his assistant Lal Chand, Dr. Balwant Singh the sanitary inspector, and Balik Ram, the *waẓir's* chief of staff. They all seemed to take an interest in our work, and we did the best we could to make the nature of it intelligible to them. At least they understood that we were making scientific

33692

studies; whereas at the court of the Maharajah of Kashmir it was generally believed that we had come all this way to seek for precious stones!

Lastly I may mention the Rajah of Skardu—or rather the regent, who acted for his nephew, a little boy of 6 or 8 years. We saw little of him. Sometimes he came to pay us a visit, once only was he persuaded to sit at our table for afternoon tea; but he would take nothing. And he always avoided a return visit from us. We could not converse, save through the *waẓir* or the *tehsildar*; he seemed embarrassed and shy and the conversation never got beyond banalities. He made a better figure upon the polo-

Group of Brokpas (Dards) at Skardu.

field, having a fine seat on his pony and playing a very good game. But after November the ground was frozen and there was no more polo.

We had few contacts with the people of Skardu, partly because of the language difficulty and partly because the *tehsildar* anticipated all our wants. There were probably a few hundred souls, scattered among the hamlets of the oasis rather than concentrated at Skardu. The misery of the Baltis has often been described. But one was even more struck by it seeing them in the winter, going about numb with cold, barely covered by the wretched homespun shawl, and certainly under-nourished. For three months of the year they live almost entirely on fresh fruit, for the other nine

on dried—the famous apricots of Baltistan, which are also a profitable article of export.[1]

From time to time all through November Ladaki caravans arrived at Skardu, bringing the fine *pashmina*-wool, cotton goods, tea, sugar, salt, a little rice. And now and then a party of Baltis left with dry apricots, barley and coarse wool (*pattu*): produce greatly inferior to their imports. Exchange is possible only by dint of the money earned by those Baltis who emigrate temporarily to the Punjab or Central Asia.

Under these circumstances, it is not surprising that the inhabitants are little disposed to public feasting and celebration. Once only, toward the end of October, we saw a certain pomp attending the wedding procession of a little girl arrayed in red, who was being escorted to the home of her bridegroom. Balti girls marry at 10 or 12, and become mothers before they reach their full growth. There appears to exist also a sort of temporary marriage which may last from a week to several months, and is really a legalized prostitution.[2] For the rest, adultery is common, by the connivance or at least the indifference of the husband. These customs must unite with the general misery to make life short in Baltistan: in fact, one rarely encounters old people.[3]

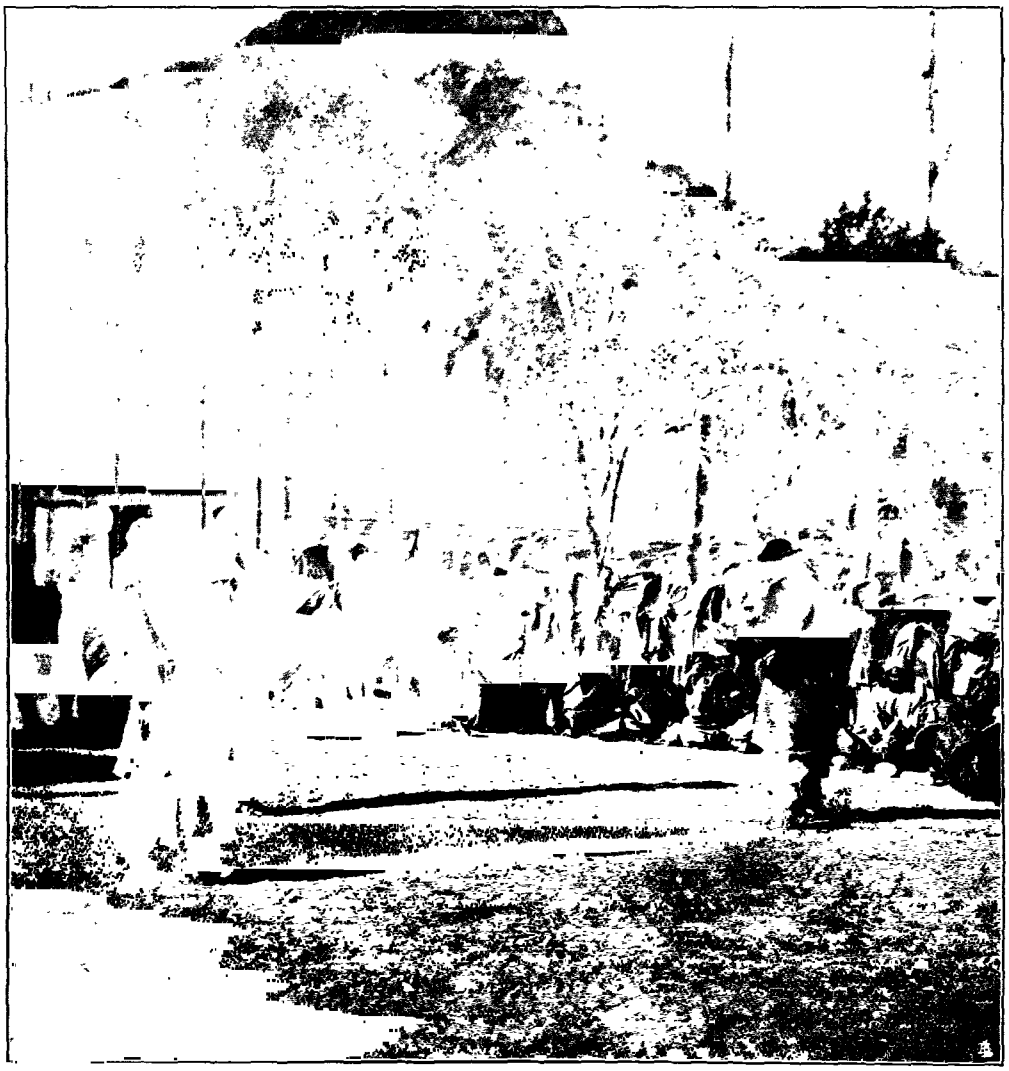
And yet, the Baltis appear to bear their troubles with philosophy. They have a light and heedless disposition, and laugh easily, showing a conspicuous sense of fun. They are too poor to have popular festivals; but take pleasure in their barbarous native music, performed by a band that consists of two very long brass trumpets, four fifes and half a dozen drums. Music accompanies the polo, and is also played for the dancing, in which, of course, only men take part, usually a group of professional dancers. They dance singly, performing the simple figures with contagious animation and vivacity, before a laughing and applauding audience.

By nature the Balti is very gentle, never quarrelsome; of a timid disposition with a mixture of respect and fear but without servility toward the European. A good soul, in short, without a trace of arrogance or self-assertion. Even so, I have seen this people completely transformed by religious fervour, displaying an immoderacy of passion unbelievable in a folk so paganly indifferent in their daily lives. I refer to the feast of the *Muharram*, when the Shiah sect of the whole Mohammedan world enacts, with

[1] In the spring of 1835 Hügel (*op. cit.*, p. 144) sent a sack of potatoes from Srinagar to king Ahmed Shah, in order to introduce the cultivation of them. But I doubt if he was successful, for I saw no sign of that valuable tuber anywhere in the country.

[2] Rosita Forbes (*Angora to Afghanistan*, London, 1931) mentions the existence, in Najaf, a religious centre of the Shiahs, of the *mutta*, or marriage for a fixed period, from a day to a week, a month or a year.

[3] For the comparative longevity, see Cunningham (*op. cit.*, p. 290). Vigne (*op. cit.*, Vol. II, p. 258, pp. 263 *sqq.*) gives some data on the social customs of the Baltis. A further and more complete account will be found in Dainelli's volume of Anthropogeography in the *Relazioni Scientifiche*, Serie II, Vol. VIII.



Balti music and dancing at Skardu.

dramatic fidelity, the story of its great martyr Hussein, the second son of Ali the son-in-law of Mohammed, who was killed in battle on the 10th of October 680, at Kerbela in Mesopotamia, fighting against the army of the caliph Iasid.[1]

[1] *Muharram* is the first month of the year in the Mohammedan lunar calendar. The celebration falls on the tenth day of the month. It is well known that, according to the Shiah creed, only the direct descendants of the prophet by his daughter Fatima have the right of being venerated by the Faithful.

Poverty-stricken Baltistan cannot, of course, compete with the magnificent scenic and historic productions, the splendid processions, ceremonies and pageants of wealthier communities in the world of Islam. But I doubt if anywhere else is evinced a greater religious fervour or a more dramatic display of tragic and inconsolable affliction.

In 1913 the feast fell on December 11th: or rather, on that day was held the culminating ceremony of a period of ten days entirely devoted to commemorative devotions. The previous night had been spent by the people in wailing and lamentation. Then on the 11th, a little after midday, we betook ourselves with the *tehsildar* to a plain between the village and the rock. In the centre of this stands a square building with little windows: the house of wailing. Some distance in front of it was drawn up a guard of honour composed of the hundred soldiers of the garrison. Not long after we reached the spot we began to hear a distant murmur which swelled into shrieks of lamentation as the procession came in sight. It represented the funeral cortège of Hussein and of Hassan his brother, who was killed at Medina 11 years earlier and is mourned with him. First walks a group of women, followed by a disorderly troop of men surrounding two biers (wooden frames covered with red material) carried by bearers, and a horse entirely shrouded in a white cloth, on top of which is the saddle holding the two turbans, of white material intertwined with a red veil to represent blood. There is likewise a sort of canopy of torn and stained yellow stuff. Standards and banners of white or white with a red border are borne about on long poles. Among the bearers of the biers is the Rajah himself, arrayed in pure white wool. Next him walks the mullah. The people about the biers walk with their faces turned toward them and the horse, those at the front of the procession walk backwards. Every head is uncovered, showing the long tangled hair. The faces are tear-stained and distorted. And all, as they walk, scream out a short refrain with a varying rhythm, alternated with the invocation repeated hundreds and thousands of times: "O Hassan, O Hussein," beat their breasts with their clenched fists, or strike their heads or faces with the open hand—all with unheard-of, incredible violence. Men near the biers touch the cloth with one hand, which they then pass over the face and head. Progress is very slow, as the procession halts every 50 yards, while the cries and wails and beating of the breast grow ever louder and more vehement. Above the crying the blows make a dull, rhythmic noise as of drums. The women weep and cry out too, but not in rhythm and they do not beat their breasts. The spectacle of a whole population displaying such violent and immoderate despair is truly extraordinary. This grief and piety are so real and moving, one forgets that it is all a play.

The procession approaches and enters the house of wailing, men and women by opposite doors. The building is not large enough to hold them all, many crouch exhausted outside. Even the horse is made to enter the little shrine, but comes quickly out to meet and join other processions from neighbouring hamlets, amid the same fanatical demonstrations. From the mosque comes the raucous voice of a mullah, address-

ing the crowd; now and then he is interrupted by an invocation from the crowd, and a chorus of cries marks the end of his speech.

Now the processions—there have been three of them—re-form outside the mosque and together move towards a cemetery not very far away. In the sandy tract that stretches at the foot of the rock to the west of Skardu, there is a large solitary tree, split in two from top to bottom, so that one-half of it lies on the ground, leafless, withered and bleached like a skeleton, while the other half is alive and erect and putting forth branches. At the foot of this tree a square space has been dug out a little and surrounded by a low stone wall. Inside, some ten coloured pocket-handkerchiefs are spread on little heaps of sand; and two small rectangles formed by twigs stuck into the ground are covered with other variegated bits of cloth. These represent the tombs: the two largest for the nephews of the prophet, the others for Hussein's followers who fell with him. There are two other such cemeteries close by, each for its own procession. The poverty of these resources is as striking as the childish ingenuity they display.

No one may enter these enclosures save with bare feet. The crowd gathers round the larger one, the blows and wailings continue. The biers and the canopy are ranged in a row; in front of the pretended tombs three mullahs weep and gesticulate frantically, beating their breasts, their heads and their faces, and hoarsely yelling the invocation in what remains to them of voice. The crowd does its best to emulate them. All the women are collected about another rectangle. The horse is conducted in slow procession to each cemetery in turn, surrounded by a mob yelling without intermission. The animal's plodding gait, his calm, indifferent eye suggest that only in him does reason hold her sway; encompassed as he is by a crowd whose emotional state has now passed into a frenzy and a possession. Men of all ages pass one hand over the handkerchiefs on the ground and then rub their faces, throats and brows. I saw an old man carrying a child and repeatedly caressing first the handkerchiefs and then the infant's head.

After some half-hour the processions return, accompanied by the same scenes—one marvels at so much physical endurance. Somebody faints and is taken in charge by Dr. Balwant Singh, Hindu, who, like the *tehsildar* and the impassive Sikh soldiers, has been looking on with philosophic tolerance at all this religious exaltation.

The origins of Mohammedanism in Baltistan are somewhat obscure. There is no doubt that the whole country was once Buddhist, or rather Lamaist, just as Kashmir was, and as Ladak is now. The change seems to have taken place at the end of the 13th century or the beginning of the 14th, simultaneously with that in Kashmir and the western districts of Hunza, Gilgit and so on. But we do not know how they came to adopt the Shiah creed instead of the Sunni, which obtains in neighbouring Kashmir and Turkestan.[1]

[1] See the various theories on the subject of the conversion, all based more upon local tradition than upon historic data, in Vigne (*op. cit.*, Vol. II, pp. 250–1); Drew (*op. cit.*, p. 359); Biddulph (*op. cit.*, p. 108 *sqq.*), and Neve (*op. cit.*, pp. 81–2). Also Dainelli, in the next chapter, p. 92.

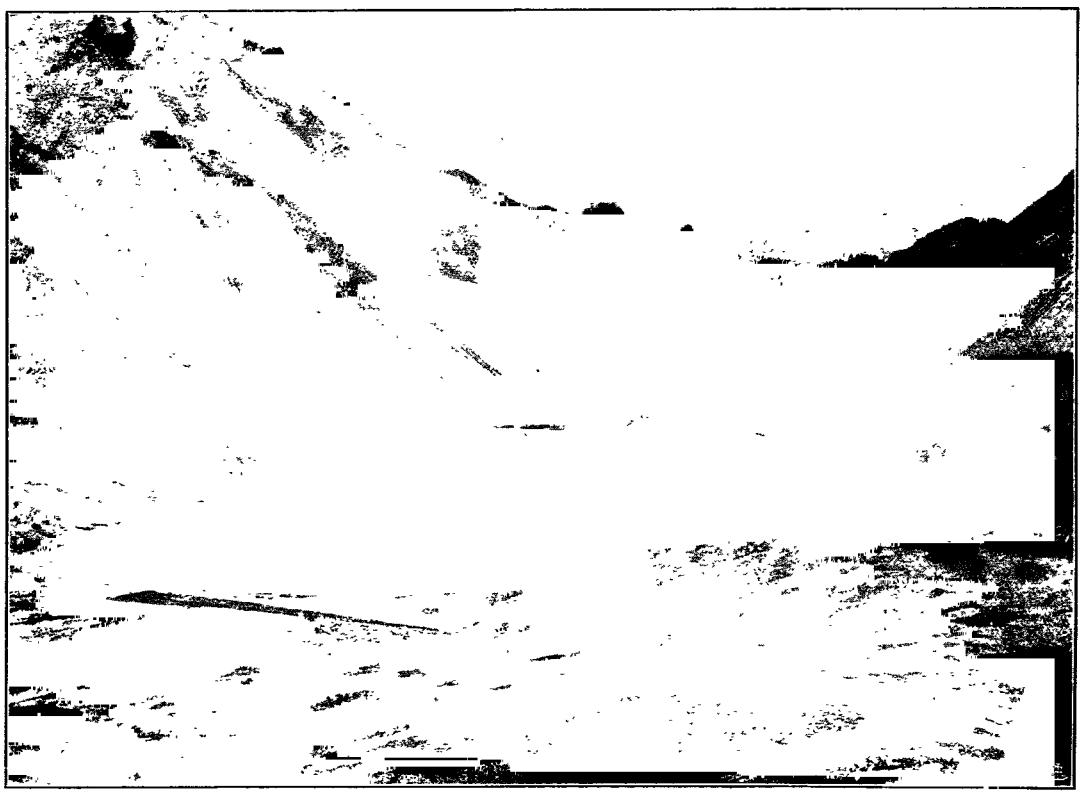
Another ceremonial, quite different from the *Muharram*, is the so-called *Basant Pañchmi*. *Basant* means yellow, the colour of the sesame, the first spring flower that blossoms on the plains of northern India; and the feast is understood to celebrate the return of spring. It falls between January and February, which in Baltistan is actually the very middle of the winter; and thus does not correspond either by origin or seasonally to any Balti tradition. However, it is a national festival throughout the territories of the Maharajah, in mountain and plain alike; and a most important day for the public treasury if not for the public, for upon it all the state officials make a present to their sovereign of a certain percentage of their salaries (*naẕar*). In Jammu the *durbar* is held by the Rajah in person, in the provinces the highest official presides. In Skardu it took place on January 31st, in the largest room at the offices of the *waẕir-i-waẕarat*. The floor was carpeted; on one wall was the divan or throne, with yellow silk cushions, and a little embroidered rug in front of it, before which knelt all the officials of Skardu, the principal citizens and one or two visiting Ladakis. A Brahmin priest set two little silver cups of burning incense in front of the throne and murmured a brief prayer; then all the officials, from the *waẕir* and the *tehsildar* down, came one by one and deposited a little pile of silver rupees, while a clerk took down the amounts. Outside in the courtyard was the band and the soldiers of the garrison, who had brought along their two little cannons with which to fire a salute. No public demonstration or rejoicing accompanied the ceremony. In the evening we were invited by the *waẕir* to a gala dinner. A second ceremony of the same kind is held in October.

During December and January Dainelli was away most of the time, exploring the remote valleys of Baltistan and the great glaciers which come down into them. He will tell his own story in the next chapter. The rest of us were fully occupied by the work of the station. We were able, however, to make a few short excursions to places of interest near by. South of Skardu a long spur comes down from the Deosai plateau, separating the Burji-la and Satpor valleys, and ending in a sharp peak, the Pin Tower, over 3,000 feet above the plain. The view from this height is one of the most beautiful in the whole basin. I have already mentioned the valley which goes up to the Burji-la. We also visited the Satpor valley, an interesting excursion in many ways, beginning with the erratic boulder which lies near the village of Olting, at the end of one of those strings of moraine which project from the mouth of the valley into the plain. It has a flat surface some 8 feet across, covered with graffiti representing Buddhist figures; so far as I know, no one has called attention to these before. On the left side is a tall standing figure with a mitred crown and a halo. Next to and above this are three Buddhas on lotus thrones, with their hands in various ritual attitudes, also a smaller figure with a halo. Beneath are ten figures of disciples or minor Buddhas, in two rows.

Just at the mouth of the valley there is a second and larger erratic block, 23 feet high by 13 feet wide, upon which is carved in low relief a Buddha framed by a row of

small Buddhas in ritual attitude, between two large standing figures which occupy most of the height of the stone.[1]

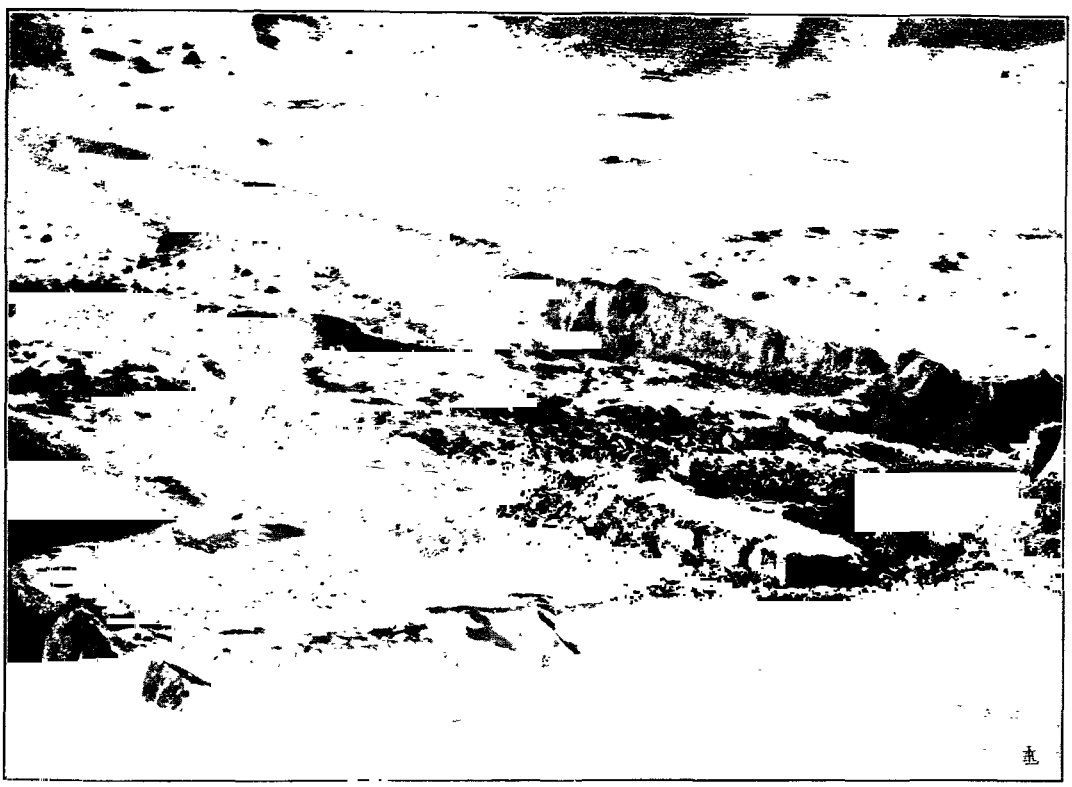
It is from this point that the ascent of the Satpor valley begins—or rather the ascent of the high moraine which closes its mouth, in such a way that the pent-up waters have formed a beautiful little deep-blue lake behind it. It lies some 1,300 feet above



Lake Satpor from its lower end.

[1] This Buddhist monument, already mentioned by Vigne (*op. cit.*, Vol. II, p. 261), has been minutely described by Miss Jane E. Duncan (*A Summer Ride through Western Tibet*; London, 1906, pp. 297–303); she also gives Dr. Francke's interpretation of the figures and the inscriptions and there is a good illustration of the relief in the frontispiece of the book. On top of the block, above the central Buddha, there is a hole which Miss Duncan thinks served to hold a lamp. But there are two slits on the sides, a little lower down; and I think all three were meant to hold the ends of the beams that supported a little sloping roof to protect the monument from the weather. The rock carving of the Buddha of Mulbek, of which I shall speak presently, has the same holes which undoubtedly served the same purpose. It is a fact too that in the Lamaist temples and shrines the votive lamps are, as a rule, put at the feet of the divinities, not suspended above them.

Skardu, is nearly half a mile across, and takes up the whole floor of the valley for a distance of over a mile. Near its northern end, toward the valley, is a small flat island about 100 yards in diameter, covered with blocks of stone and bordered by a belt of shrubbery. The right shore of the lake is straight, with few or no irregularities, the left has two shallow indentations. Both banks descend steeply into the water. Both



Dike, Lake Satpor.

the upper and the lower ends, toward the moraine and the mountains, end in two straight lines, giving the lake a rectangular shape.

At the mouth are the remains of an ancient dike, which must have been a work of some importance. It is a buttress 15 or 18 feet high, with an outer sustaining wall built of large stones. In the middle of this were the locks, a good many of which are still *in situ*; they are made of stones cemented with a mortar of powdered brick and lime. The locks are formed by two rows of rectangular apertures, one above the other, framed by cut stone plinths in which can be seen the grooves for the gates—likewise of stone—to run in. Some of these slabs lie flat in the water. At the end of the dike are two

other flood-gates. Miss Duncan says that the higher of these was, until some 30 years ago, ornamented by Buddhistic carvings, which were carried off by the soldiers of a Nepalese detachment, probably themselves Buddhist, at the expiration of their service at Skardu. Miss Duncan also reported the tradition that the dike and locks were built by the last Buddhist rajah of Skardu, who was slain by the Mongol invaders: according to which they must be at least five centuries old.[1] To-day the water has cut a channel to the left of the locks and the dike and flows through a notch 160 feet below the ridge of the moraine. Between the locks and the lake itself there is a rude retaining wall, evidently a later structure and no longer serving any purpose.[2]

Remains of fortifications on the east side of the lake.

Only a few small streams flow into the lake itself, and the valley contributes but one insignificant brook; yet the outlet is of considerable size, and one is forced to conclude that the lake is fed by springs in its bed. This would also explain why there was no sign of ice in its waters, though on the night before we visited it the temperature had fallen to about 12° F.

At no great distance from the dike are the ruins of a few small huts, where at some time a bodyguard may have been stationed. And in fact an ancient defending wall runs down the right side of the lake at about its centre, resting upon an enormous boulder at the bottom, and thence clambering up the precipitous side for quite a distance. A few yards farther down a second wall runs from the path down to the level of the lake.

Above the lake there is a good stretch of perfectly level valley, with a pebble-strewn floor; then the sides narrow and you begin to go uphill. Just at this point lies the little oasis of Satpor. No doubt there was a time, probably when the locks were in

[1] Jane E. Duncan, *op. cit.*, pp. 304–7.

[2] According to Miss Duncan, it was built by the last independent Rajah, Ahmed Shah (*op. cit.*, p. 307).

operation, when the lake covered this flat part of the valley as well. The chief product of the Satpor valley is firewood, which many Balti porters carry on their backs to Skardu.

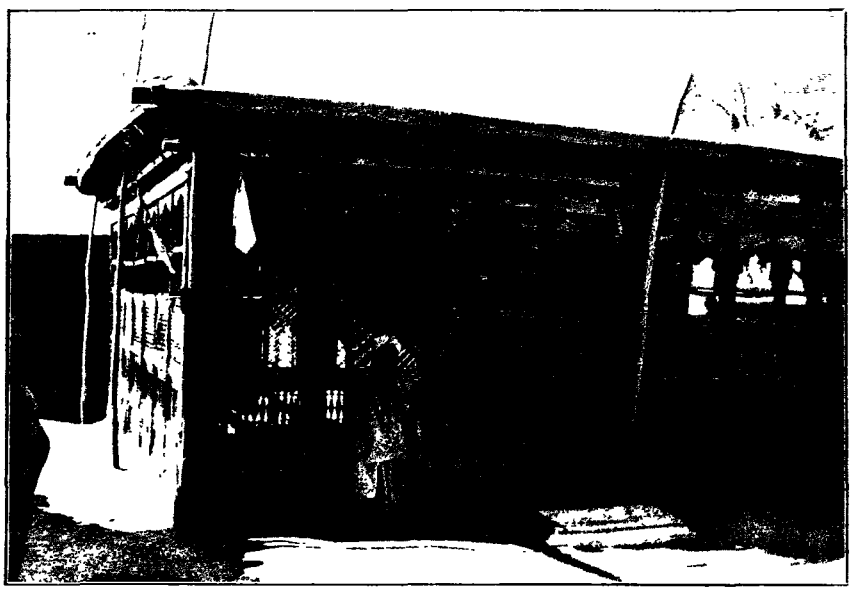
Ginori, Antilli and myself also took advantage of one of the *waẓir's* tours of inspection to accompany him on a three-days' excursion to the oasis of Shigar. We were ferried across the Indus below the rock of Skardu and crossed the sandy delta on the right of the confluence of the Shigar and the Indus, beyond which we reached the oasis of Kuardo, which nestles at the feet of the Marshalang. This is an imposing moun-

Kuardo, with the Rajah's Palace.

tain, 18,200 feet high, which stands at the end of the chain on the right side of the Shigar valley. Kuardo is a flourishing and beautiful oasis; the fruit-trees hang heavy with clustering vines. In the centre of the village is the square palace of the Rajah; a little farther up, on the hill-side, is a sacred tomb, or *maẓar*. It is built in the usual way, with a roof supported by upright beams, between which are open-work wooden screens with various designs, hiding the little oblong room that holds the marble tomb. The walls of the chamber are ornamented on the outside with floral paintings and decorations in

the Persian style. The bare-footed old mullah who acted as custodian told us that the tomb was three centuries old.

From Kuardo we went up the sand-covered right bank of the Shigar as far as the oasis of that name where we forded the river—it separates here into a number of channels. The water came up to the bellies of the horses, the current was swift, there were quick-sands in places; in short, some of us found the crossing anything but smooth. But a brisk trot of twenty minutes brought us to the lodging prepared for the *waẓir*, a little house near the polo-field, once lived in by the Swedish missionary Gustavson.[1] There a bright fire soon dried our clothes for us on our backs. The rest of us lodged in a



Sacred tomb near Kuardo.

new bungalow built on the river-bank above the village, beyond the stream which flows through the oasis. Shigar has a milder climate than Skardu, and its vineyards and orchards of apple, apricot, pear and walnut trees are renowned throughout all Baltistan. There are some fine plane-trees, besides the usual willows and poplars. It is the capital of a district which, while smaller than Skardu and less important politically, is more fertile and prosperous.[2] But the people are neither so good-looking nor so healthy. There are many goitres, which one does not see in the valley of the Indus, and some

[1] Gustavson lived for several years at Shigar, and was still there in 1902. He translated various religious works into the Balti dialect; but despite all his efforts, he made no converts.

[2] See in Cunningham (*op. cit.*, pp. 32–4) the genealogy of the rajahs of Shigar. They were usually subject to the Balti rulers of Skardu.

Shigar valley and oasis, from the valley behind it.

The Grand Mosque, Shigar.

rachitic deformity. The oasis links up a whole chain of little villages extending for 12 or 15 miles on the left bank of the Shigar, almost to the point where it joins the Indus.

The oasis of Shigar is watered by a stream of moderate size which flows down from the mountains behind the village. The mouth of this valley is entirely closed by an old terminal moraine, but the torrent has cut a narrow passage in the living rock at the left-hand corner; thus the moraine has not, as at Satpor, caused the formation of a lake. A path leads up through this valley to a pass by which one can reach Khapalu in the Shayok valley. This is probably the route taken in 1840 by the column of Zorawar Singh's soldiers, who fell into a trap laid by the Baltis and were nearly annihilated. Vigne is perhaps the only European to have traversed this short cut between Shigar and Khapalu.

Gallery on the south side of the Grand Mosque.

There are three mosques of uncertain date at Shigar, estimated at from three to four centuries old. They are all badly preserved; the only one still in use is the largest, near the bridge which spans the stream. It is of the same type as the mosque of Shah Hamadan at Srinagar. The façade, facing east, consists of a portico as high and wide as the building itself, into which open three doors in Saracenic style. On the south side is a gallery of very pleasing design, reached by a wooden stair; here the women sit on a good thick layer of hay and listen to the services through a wooden lattice. In the centre of the roof is a square aperture with a little columned superstructure, surmounted in its turn by a curious pinnacle resting on crossed poles that must in the past have held some kind of decoration. The structural material of the building is chiefly wood; but the pillars of the portico, the roof, and the corners and framework of the walls are filled in with sun-dried bricks. The inner chamber is a single room, with four pillars which support on their carved capitals the four corners of the aperture in the roof. The walls have lofty windows closed by ornamental wooden lattices. The wall at the western end, which in the Sunni mosque holds the *mirab*, the mural niche that

indicates the direction of Mecca, is here occupied by a kind of throne (or representation of a tomb?) covered with carpets. Two mullahs acted as our guides to the mosque.[1]

The other two mosques of Shigar are smaller; they are now unused and in a ruined state, but quite as well worth seeing and perhaps in their time even more elaborately ornamented. The proportions are most pleasing, and you can still see the delicate and complex designs carved on the rafters, ribs and grilles. The one near the large mosque is like it in also having the square lantern on top; but it is in two storeys, the lower with the usual door on the eastern front, the upper with a covered balcony running all round it. The third mosque, at the top of the village, had a portico on two sides, but only part of it is still standing. It is a square building with a closed, slightly sloping roof.[2] A little way above it is a large formless structure in several storeys, the Rajah's unfinished palace.

The beams in all these buildings seem to be of walnut; there may be some cedar as well, but in any case the wood did not come from these valleys, and one marvels how great beams such as they needed for the castle of Skardu and for these mosques could have been brought from distant regions across rough paths which are difficult even for ordinary loads.

On the afternoon we spent at Shigar we saw a very picturesque archery match, on foot and on horses at the gallop. It was the only place in Baltistan where I saw these contests; they are perhaps imported from Ladak, where drawing the bow is a very popular sport. But in Ladak I did not see it done on horseback.

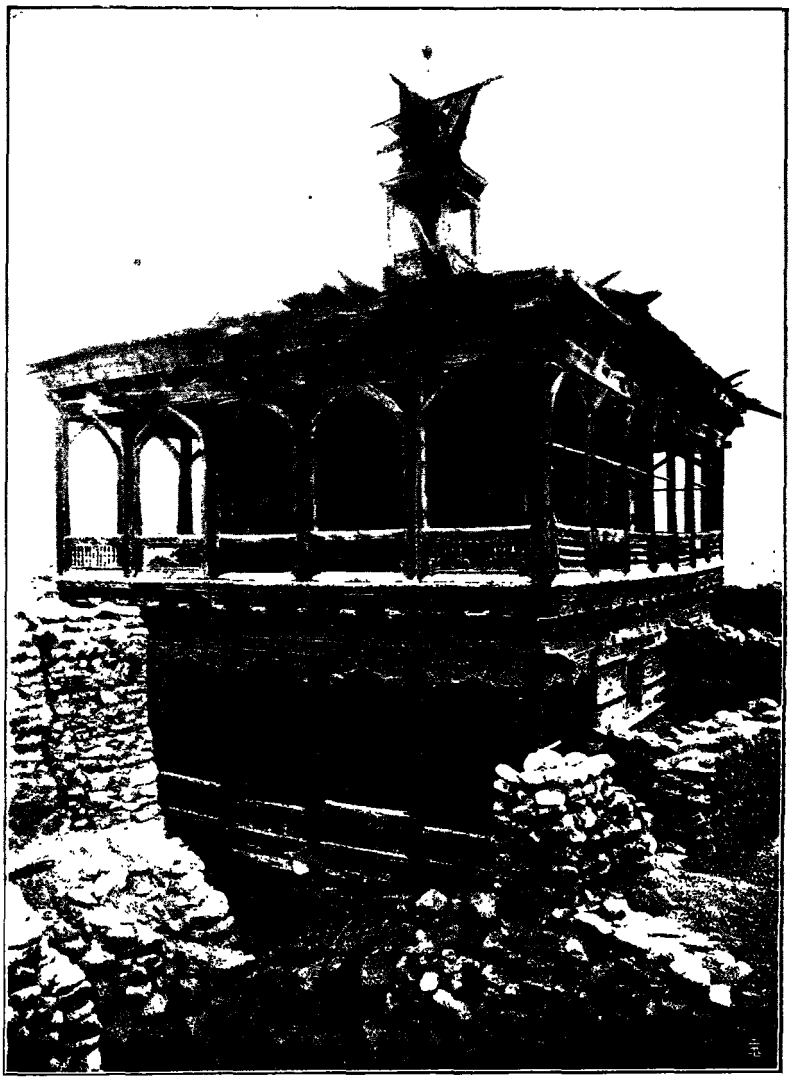
We returned to Skardu by the usual route, along the left bank of the Shigar river and across the end of the Strongdokmo spur, which stretches between the Shigar and the Indus, with the ferry to Skardu on the farther side.

The description of our life, Dainelli's excursions, the geodetic work in the open air, and the rich harvest we brought back of photographs and panoramas, is enough to show that winter in Baltistan is not so rugged as one might expect in a region from 7,000 to 10,000 feet above sea-level, enclosed between high mountain ranges, in a latitude between 35° and 36° N. The thermometer, it is true, sometimes went down to zero, in December and January, but the very calm air made this quite bearable. The strong winds which blow in these valleys every summer afternoon were almost entirely absent. Toward the middle of December the Indus began to bring down floating ice, evidently broken off the banks higher up. In the morning hours clusters of curious ice formations came down, great round or oval pieces of every size,

[1] Neve (*op. cit.*, pp. 81–2) gives some information which he had from the Rajah of Shigar upon the mosques of the district. Eight of them are said to have been built in the 14th century by Mir Yahya, the son of Mir Sheik Dana-Ali-Dana, who converted thousands of Baltis to his faith.

[2] On the architecture of the mosques of the Indus and Shigar valleys see Sir Martin W. Conway, *Climbing and Exploration in the Karakoram Himalayas*; New York, 1894, Vol. 1, pp. 567, 582, 586.

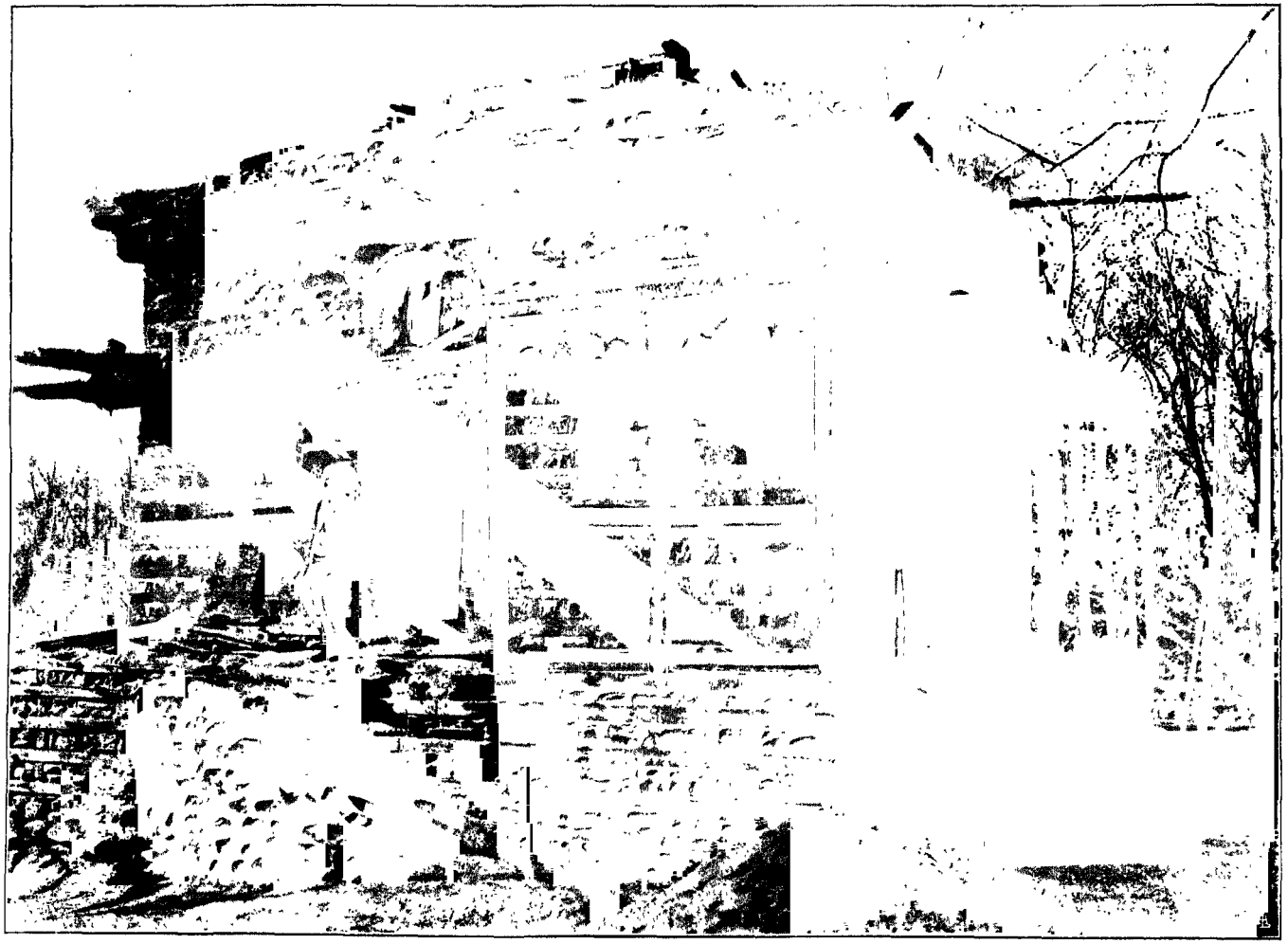
like shallow cups with the edges turned up and whitened; they resembled large drops of wax hardened in water.[1]



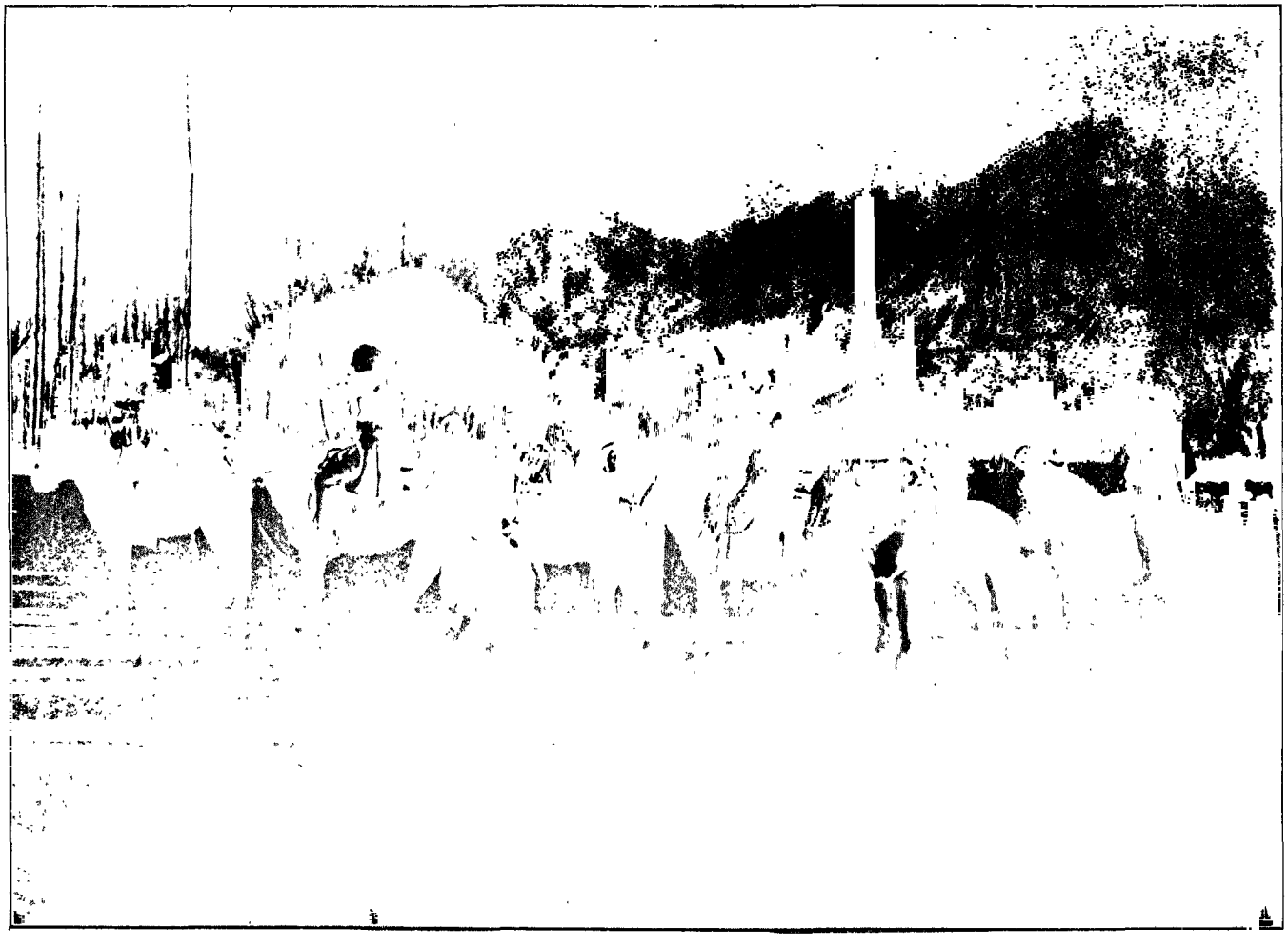
Two-storeyed mosque, Shigar.

In January the coldest period came to an end and the temperature gradually rose. Snow fell for the first time, not very plentifully, on December 10th, and again

[1] Thomson (*op. cit.*, p. 235) also noticed these ice formations in the Indus in December, 1846.



Mosque, Shigar.



Archers at Shigar.

at long intervals, seldom in great quantity. Only four times did we have real snowfalls: on December 21st, January 12th and 28th, and February 14th.[1]

By day the sky was often lightly veiled, the peaks hidden but not by heavy cloud. The air was usually very clear, without mist in the valleys; and there would come transparent days when all the crests and snowy peaks stood out resplendent in the sunlight. The evenings and nights were nearly always of great brilliance. I recall sunsets, pervaded by the deep stillness of the high mountains, when the last call to prayer, the curfew of the Mohammedan East, would sound from the village mosques and mount limpidly into the serene atmosphere. Round the horizon the snowy crests showed just faintly bluish, with an extraordinary clarity as though you were looking at them through a telescope, their teeth and notches cut out in relief against a sky of the most delicately blended hues: violet, pure azure, green and rose. And all these colours of the sky and snow, and the images of the mountains, were reflected in the shining mirror of the Indus.

After sunset, the glowing rose and violet of the sky was powdered by extremely brilliant stars, not white but pale beryl colour; the air became a sort of diffused luminousness that revealed all the details of the landscape. The moon was so bright that she seemed a different planet, a great refulgent globe hung in a vault unutterably deep; from her streamed a white light so intense that everything looked as though covered with new-fallen snow; the black shadows cast by the indentations and jutting angles of the mountains gave them variety of design impressive and grandiose beyond words.

Since the beginning of November I had been studying the difficult problems of provisioning and transport involved in our campaign for 1914 in the desert regions of the Karakoram. I calculated the quantities needed to feed the porters and pack-animals for the period of nearly five months which we should pass on the high plateaux; and my results seemed extravagant, by comparison with the resources of the country which must furnish the supplies. And even after all this stuff had been successfully got together, the problem of moving it to the right places seemed even more insoluble. I could never have made a practicable plan without the help of the *waẓir-i-waẓarat*. Not only had he knowledge of what resources we could command in Baltistan and Ladak, and the power to get them assembled, but he possessed experience of organization and a great fertility in expedients and contrivances. With him and Balik Ram, his chief of staff, I had many long conferences; and our plans, as we agreed upon them, were communicated to the *tehsildars* of Skardu, Leh and Kargil for execution.

The most important thing we had to buy was the barley flour (*satu*). The local

[1] Thomson (*op. cit.*, p. 243), in 1847, recorded the lowest temperature, zero, on February 8th. His first snowfall was on the 28th of November, and snow fell every few days from then on, gradually increasing in quantity until by the middle of February it was 12 to 18 inches deep. There seems to have been less precipitation in 1913–14.

Mount Marshalang (20,500 ft.) in the Skardu basin.

barley is a special variety, without chaff, being bare and separated from the husk like corn. This variety grows from 8,000 feet upwards, and at a lesser height seems to take on the characteristics of ordinary barley.[1] No cleaning is necessary, and the grain is parched in special furnaces immediately on threshing and then ground, producing a flour with a nice smell of toast, and this is the *satu*. It is the chief food of the Ladakis: a most economical and convenient form of nourishment for caravans in desert regions where there is no firewood, because it is already cooked. We needed 36 tons of it. Next came the melted butter (*ghi*), which is poured into leather bags made with the hair side in, where it solidifies. Then we needed tobacco, tea, salt, sugar, rice, lentils (*dal*), and lastly several tons of barley and oats for the horses.

Such large quantities could only be got together by levying on all the villages in the districts of Skardu, Kargil and Leh. The *tehsildars* spread the news that good prices would be paid, but the merchandise did not come in. As the month advanced, the puzzled *waẓir* had to confess that the harvest was unaccountably barren. We investigated anxiously, and at last found out the truth: preparations on such an unaccustomed scale as this had given rise throughout the country to the belief that a military expedition was in progress. The hundreds of cases of food for us Europeans, which had been distributed in Baltistan and Ladak months before our arrival, were supposed to be cases of ammunition; our steel cylinders of hydrogen became cannon in the popular fancy, which found confirmation in the care we took to protect them from shock, to keep them away from fire and permit no smoking near them. War with China or with Russia—it was all one to these poor people, who envisaged the return of the *corvée*, forced labour and conscription. Naturally both Baltis and Ladakis thought to paralyse the enterprise by withholding supplies. As soon as we discovered the ground of their reluctance, we had no difficulty in convincing them that our intentions were pacific; whereupon, in the course of a few weeks, we got together everything that we needed.

After the barley had all been sent to Kargil and parched in the ovens, a new difficulty arose: it could not be ground, because the streams that worked the mills were frozen. At last we found a mill which was in operation, and in February some of the streams began to flow, so that at last all was ready in time. I mention these details to show how the unexpected can sometimes jeopardise the best-laid plans.

On the 11th of February I sent to Kargil an advance guard of 50 laden porters, in charge of the *shikari* Abdullah. In the next few days we dismounted the instruments, sorted all the luggage and made up the loads. And we took leave of our kindly hosts,

[1] See Lawrence, *op. cit.*, p. 341. This sort of barley without chaff was already referred to by Marco Polo, in Badakshan (Afghanistan). See Yule's *Marco Polo*, 2nd edition, London, 1875, Vol. 1, p. 171. Moorcroft (*op. cit.*, Vol. 1, pp. 271 *sqq.*) speaks of six different varieties of *hordeum nudum*, *glabrum*, cultivated in Ladak, and observes (p. 277) that in a warm climate it becomes ordinary barley; also that the converse happens when ordinary barley is planted in the mountains. The husk round the grain bursts when it is ripe, leaving it bare.

who despite the season regaled us with fresh fruit and vegetables up till the end. On February 15th I sent on another 74 loads, and on the day following we took up our march with a caravan of 50 porters. The *tehsildar* was to enlist another 150 and send them on to Leh within the next few days, with the remainder of the provisions bought at Skardu.

CHAPTER IV

WINTER EXCURSIONS IN BALTISTAN [1]

By Giotto Dainelli

Preliminary trips in Kashmir—Along the Skardu road—In the Skardu basin—The Braldoh valley as far as the Baltoro glacier—The Basha and Shigar valleys—Up the Shayok valley to the confines of Ladak—The glaciers of the Saltoro and Kondus valleys.

[*Phot. Dainelli.*

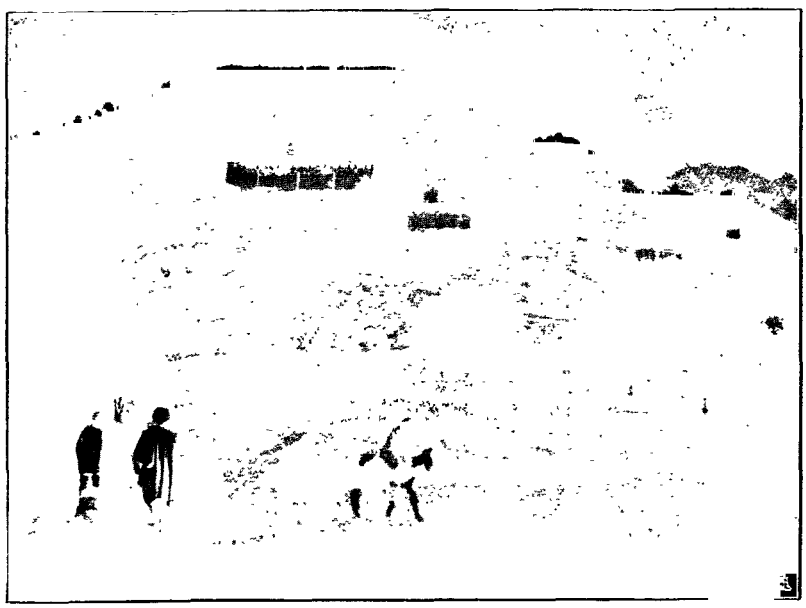
Balti types.

MY geographical and geological work began in Kashmir, where I profited by the stay which the expedition made for its geophysical observations and for the organization of its campaign to undertake certain excursions, by way of preparation for the scientific labours awaiting me beyond the Himalayas.

I had arrived at Srinagar not in the best of health. During the railway journey from Bombay to Rawal Pindi I had contracted *filaria sanguinis*, with effects which at first were decidedly severe, but disappeared by degrees; I was entirely free of them until shortly after I returned to Europe, when they recurred again to trouble me. However, as my strength returned, I made longer and longer excursions each day from our centre at Srinagar. The banks of the Dal, the isolated hill of Hari Parbat, the Takt-i-Suleiman

[1] Professor Dainelli is not responsible for the spelling of the geographical names in his chapters, which has been made to conform to the official English spelling. See note in preface, p. v. For a more detailed narrative of Dainelli's work see his *Paesi e genti del Karakoram*, 2 vols., Florence, 1924.

(the farthest spur thrown out by the Himalayan range toward the Kashmir plains)—these were the goals of my first short expeditions. Next I went a little farther away, along the slopes near Kunamu ; then to the region of the Awantipur terraces and beyond. At last I undertook a longer excursion, and had my first experience (for this expedition) of life under canvas : I set out to ascend the Lidar valley as far as Pahlgam, to return to Martand and Islamabad, thence to cross the Kashmir basin to the foot of the opposite chain of Pir Panjal at Shapiyon, and return to Srinagar, skirting the base of this outer chain, then cutting across the region of those characteristic terraces—known to the natives as *karewas*—which form the chief morphological feature of the



[*Phot. Dainelli.*

The monastery of Eishmakan, in the Lidar valley.

great plain of Kashmir. The Pir Panjal I touched again afterwards, crossing the basin a second time to Ferozpur and thence going up to Gulmarg.

These were but few and short excursions (from the 1st to the 20th of September 1913) when compared with the interesting field presented by the region. However, it is easily accessible from the Indian plain and much frequented in summer by the English colony. Thus it has already developed a copious literature and from the point of view of geology in particular has benefited by detailed research. It was not to be expected that these excursions of mine, undertaken solely with a view to familiarizing myself with the general conditions of the country, could yield me numerous or novel results. I did, however, hit on some fossiliferous localities, one of them not previously

recorded so far as I know, and there began my palæontological collection. And I made certain observations upon human habitations and human settlements, tracing what was characteristic in the transition from the type of house or dwelling in the Kashmir plain to the Alpine type of the Himalayan valleys. The native houses were a curious mixture; some had sloping roofs suited to the local conditions of rainfall, others were of the flat-roofed type imported from the dry Indian plains by shepherds more lately settled here. I was especially interested in the characteristic *karewas*, the extensive terraces cut into the recent filling material of the Kashmir basin. Their lithological and altimetric conditions supplied me with data for an attempt to reconstruct the latest phase in the geological history of the region—a fascinating study, leading to the conclusion that there has been a very recent uplift (perhaps still going on) of the Pir Panjal range, which must previously have been represented by a stretch of gently undulating hills; that is, when the Himalayan valleys opposite were sending down the great glaciers of the glacial period.

From the 21st of September to the 25th of October I accompanied the main body of the expedition on the march from Kashmir to Skardu, in the heart of Baltistan. A few excursions, however, round the Sonamarg basin, in the Sind valley, gave me the opportunity to examine at closer range that typical moraine amphitheatre which had already attracted the attention of other travellers before me, and to interpret it in a way which is both less fragmentary than and also quite different from the interpretations of my predecessors. I need not go into the daily routine of my normal activities in the expedition.

We crossed the Himalayan watershed, and made our first stop in the Dras basin, for one of the series of geophysical stations. I took advantage, naturally, of this halt to make some geological excursions in the mountains to the north and south of the basin, and to make a little survey of its typically terraced bottom.

Meanwhile, at Mutaiun, a good stage above Dras, I had come in touch with my first trans-Himalayans, and begun to investigate not only the soil of the country but the people as well. I kept on with these parallel lines of research all the way to Skardu and during all my trips in the upper Indus basin.

I realize now that when I penetrated into the Dras valley I was imperfectly—or even erroneously—informed on the subject of its population. It is uniformly stated by travellers thither that after crossing the Zoji-la you enter the area of diffusion of the Balti people. This is not the case. The region is for the most part typically Brokpa; farther down, near the confluence of the Dras and the Suru, there is a mixture with the type which I have distinguished by the name Purig, after the district in which they dwell. Next, in the first part of the Indus valley, on the way to Skardu, we are again with the Brokpas; after which we meet with the Baltis. All these peoples, and others which I was to recognize later on (Dards of the Indus, Ladakis, Changpas), quite apart from the frequent cultural differences—in the language or the religion—and apart from

the ethnical variations, which were often plain enough from the physiognomical features, had almost always differences, whether greater or less, in the costume as well. But all this grew much clearer to me in the course of my excursions, which included most of the villages throughout the region. I shall therefore discuss it further on.

But Tolti, where the expedition stopped for a new series of geophysical observations, gave me the opportunity of penetrating a little further into the life of these Balti people.

Everybody who has visited the villages of this region speaks of them as oases. But it should not be inferred that we are here in a typical desert zone. The country as a whole is arid—it is completely devoid of trees—and any expanse of grass is rare indeed: while everywhere are immense rocky stretches in which the bareness is absolute. Yet after all it is not a desert landscape, but rather the typical scenery of the high mountains. The villages, then, are oases in so far as they represent islands of vegetation and human habitation; not in an actual desert, yet isolated from each other and wellnigh lost in the midst of the barren mountains.

The people are poor. They have, indeed, few needs; but the life they lead is one of want and misery. They have no industries, except a little hand weaving; no trade, save some exportation of apricots. They must sustain life upon the products of their own soil—and the soil is poor; little of it is fit for cultivation, still less is cultivated, on account of the scarcity of water. Where there is no water for irrigation the soil remains arid and barren. There are, of course, large alluvial terraces along the rivers; but the rivers almost always flow in a bed far beneath them and the peasants do not know how to draw up the water; they can only dig canals and patiently and laboriously bring it down from a point higher up, and often enough a good distance off, along the course of the river. More convenient sites are those at the mouths of the lateral valleys, where the glacier-fed streams give water all the year round to irrigate the little fields terraced on the wide fan-shaped deltas.

This is why there is no continuous settlement or cultivation, but only "oases," nearly always nestled at the mouth of the lateral valleys.

But just this isolation—in a country where social life and the collective economy are still primitive enough—was favourable to my undertaking, the study of a Balti village as a social and an economic unity and entity.

I began by making a fairly accurate if sketchy survey of the oasis. It shows the limits of cultivation and the characteristic terracing of the fields; and makes quite clear how completely the delta of the little lateral valley limits the extension of the village and its land. There are four groups of dwellings, with huddled houses on narrow alleys, scattered along the stream: two on the highway of the Indus, one down by the river; the fourth, smallest and most wretched of all, relegated, as it were, to the top of the oasis, at the vertex of the alluvial fan. At one side, on an isolated rock among the

fields, are the remains of an old castle of the local Rajah, who now lives in some houses along the Indus a little above Tolti.

Tolti, then, not only represents an economic unit, but up to a few decades ago was also an independent little political unit, with its petty sovereign, the Rajah, who nowadays holds his old title and a modest apanage from the ruler of Kashmir.

The population of Tolti is a round 700 souls, with a marked excess of men (122 to 100 women), divided into about 130 families. True castes do not exist, but there are

[*Phot. Dainelli.*

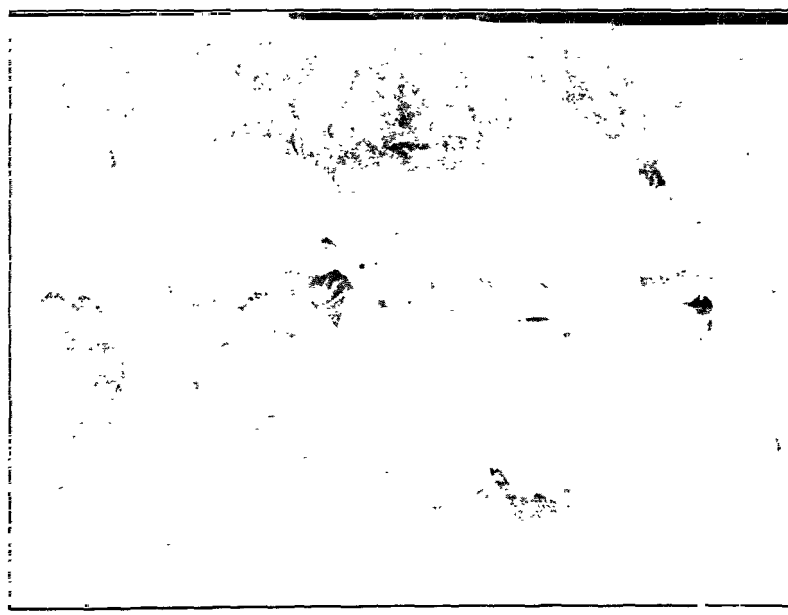
Terraced fields in the oasis of Tolti.

social groups which might be called classes, to the number of six. The first is composed of the Rajah and his family. The second counts about 25 families, with the *waẓir* at the top, as a sort of governor or local minister. The intellectual classes—priests and learned men—some 10 families, form the third ; the fourth, some 60 families, is composed of tillers of the soil ; the fifth, very few in numbers, of musicians (*mon*) ; the sixth, hardly more numerous, of the barbers and circumcisors. These last two are the lowest classes, whose members may not intermarry with the others.

I did not confine myself to collecting demographic statistics. I inquired in detail about the products of the oasis and their value ; but I need not particularize here. The chief products, in descending order of importance, are apricots, barley, millet and turnips. If we assign a given value to the average annual harvest, add what revenue

there is from the few cattle, and subtract the taxes paid to the Maharajah of Kashmir, there remains a net profit, for the whole oasis, of somewhat less than a penny a day per head.

It is true that the oasis cannot feed its entire population, and that extra barley, millet and apricots must be imported, paid for by the earnings of the coolies or the profits of temporary emigration. But reckoning these as extras the whole amount only reaches a penny a head; and even so the natural unevenness of distribution must give some families much less. All of which goes to show the frugality and the impoverished lives of the people of Baltistan.



[*Phot. Dainelli.*

Natives of Tolti, bearing gifts.

It had been arranged that the expedition should spend the winter at Skardu. Accordingly on arriving there I undertook to make a survey and a detailed study of that wide basin, which appealed to me from the moment I saw it as being of particular interest. At the same time I realized that I should not need the whole of the winter for the purpose; while, on the other hand, I was strongly tempted to explore the larger valleys of the Karakoram as far as the snouts of the great glaciers; being convinced —both on general grounds and also from what I had already seen—that in a region so vast and scientifically so little explored, the more extensive my researches were, the better. Dr. De Filippi gave me full liberty of movement; and thus I was able to traverse the Shigar, Braldoh and Basha valleys, the lower and middle Shayok, and the Saltoro and the Kondus, never before visited in the winter season.

These excursions did not prevent me from studying the Skardu basin. If I did not do so in quite the detail contemplated in my first programme, yet during the time I spent at the base (three periods: October 25th to November 25th, December 21st to January 1st, and January 25th to February 15th) I made a topographical survey which, despite the rapid method I employed, fits almost exactly into the network of points established by Commander Alessio; and also a geological survey of the recent strata

[*Phot. Dainelli.*

The Rock of Skardu, with clay terrace.

of the bottom of the basin itself. I mention this particularly, because—although I had of course collected data relative to the ancient formations on the sides of the basin, and had the good luck to find some fossil remains therein—it was this survey, together with the morphological characteristics, which gave me the clue that enabled me to work out the immense vicissitudes through which the whole region passed during the glacial period.

The features of the terrain—characterized, in particular, by those great isolated rocks near Skardu which have astonished all travellers to this region—the moraine

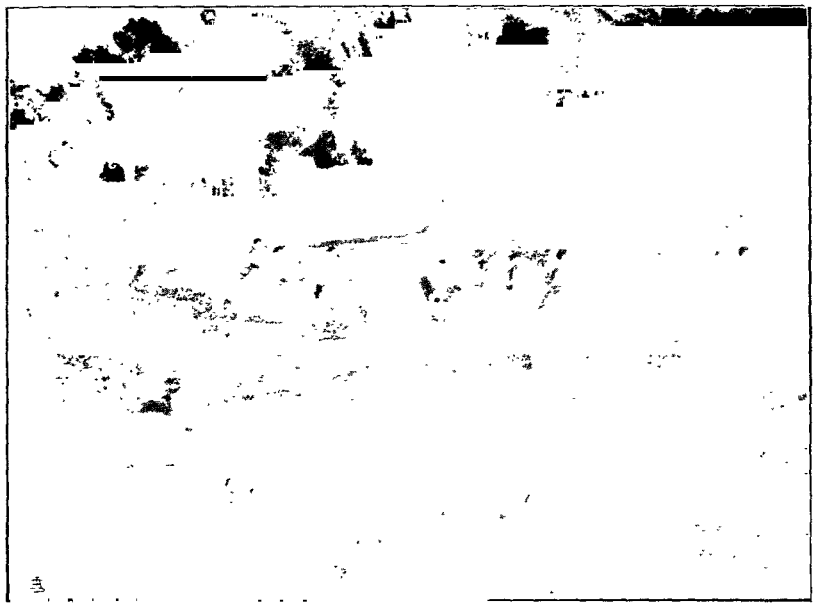
deposits, the great extension of clays, the old alluviums and old terraced fans, the sand lifted up into dunes: all these factors helped me to reconstruct the recent history of the region, and I marvelled at it as the progress and integration of my observations revealed it to me.

I saw these valleys in a first phase, invaded by immense tongues of ice, hundreds of yards in extent. Then these retreated; the valleys were deeply carven by a lifting up of the outer zone of the great range, leaving—as it were as evidence—the gigantic isolated rocks and the great terraces cut in the steep mountain-sides, which I had seen along the Indus and was to follow later along the valleys of its larger tributaries. Then I saw a second phase: other glaciers, immense ones, descended anew, and again retreated, only to reappear, in a third phase, from the side valleys into the main one. But one of these glaciers, near the lower end of the Skardu basin, heaped up such a mass of moraine before it that it dammed the Indus and formed a lake, a mighty lake, long and narrow —I followed its traces for miles and miles up the valley. And then, a fourth phase; but this time the glaciers scarcely appeared in the Skardu basin, where the Indus flowed slow and sluggish, cutting into terraces the old moraines, the old lacustrine clays, the old alluviums.

But I had to remember that I was not only geologist but geographer to the expedition. I have always felt that research in a new or little known country should not be too narrowly circumscribed, since all that one observes must have some value. I caught fish in the Indus, and Dr. Vinciguerra has recognized new varieties among them. I secured—I dare not reveal how or where—a Balti skull. One field only I left unexplored—the flora of the region—and my colleague Marinelli agreed with my view when he joined us. The Botanical Institute of Florence had kindly supplied me with the necessary equipment; but the flora at the bottoms of the valleys was abundant and varied, and had been collected before by others; so I decided to confine my collecting to the zone above 16,500 feet, where I should be between spring and summer. There I should probably be the first comer and the flora being relatively much less abundant, my collection stood the better chance of being complete. We carried out this plan, Marinelli and I, the following year, in our excursions between the Rimu glacier and the Tibetan plateaux of the Lingzi-Thang.

I made a special study of the population of the Skardu basin—not so much of their habits and customs as of themselves, physiognomically and anthropometrically, and the traditions of their origin, the types and forms of their houses, the characteristic features of their villages and of their agriculture.

Even a cursory examination of the Balti people is enough to convince one that they do not possess the Mongolian characteristics which most travellers have thought they saw in them. I am inclined to think that the idea is a sort of convention which has been automatically repeated from one author to another. For all their features show that we are dealing with white people, or, as we used to say, Aryans. Nothing



[*Phot. Dainelli.*

Balti wedding at Skardu.

[*Phot. Dainelli.*

Balti women in the plain of Skardu.

about them—not the eyes, the supra-orbital arch, the cheek-bones, the general shape of the head and face, the hair—suggests that they are Mongols. However, since very little measuring had been done in these trans-Himalayan possessions of the Maharajah, I began to collect anthropometric notes while I was at Skardu, and during the whole expedition amassed some hundreds of them. Of these, 150 are measurements of Baltis—both because of the opportunities I had at Skardu and also because they seemed the crux of the problem. For each of the other populations—Brokpas, Dards of the Indus, Purigs, Ladakis, Changpas—I have about 50, and a smaller number for inhabitants of Tibet proper.

Here in the Skardu basin I came into close contact not only with the Baltis but with the Brokpas, a people all in all very like them, though they use a Dard tongue, whereas the Baltis speak Tibetan.

I was interested in the sites chosen by these Brokpas : from the Dras to the Skardu basin they always occupy little villages at the head of the tributary valleys on the left bank of the Indus ; only rarely have they come down to the river. Now all these valleys radiate from the Deosai plateau, beyond which lies the true area of diffusion of the Dard people ; it is this region which is called Dardistan ; and from their language, and from their curious choice of a site to settle in, I deduce that the Brokpas came from Dardistan, across this very plateau, and settled in the valleys running down to the Indus, wherever the earlier Balti occupation left them room, that is to say at the valley heads. It is noteworthy that their name, Brokpa, is that given to them by the Baltis. *Brok* means distant, and *-pa* is a masculine suffix : the whole signifying men who live, or come from, afar. The name, in other words, supports my hypothesis.

Meanwhile, at Skardu, I varied my regular work—collecting, classifying notes, making survey sketches, taking anthropometrical measurements—with frequent excursions ; mostly short, sometimes two in one day, but others from dawn to sunset, or even overnight. Thus I can say that I have been almost everywhere in the basin, to the point at which it ends at Kutzurah in a vast chaos of moraine, with little lakelets : the relics of that immense deposit which once, as I have related, dammed up the Indus and produced the large lake, which was long and tortuous like a fiord.

Not only would the life at Skardu sooner or later have become too inactive for me, but also I was urged on both scientific and æsthetic grounds to visit the marvellous wild valleys of the Karakoram and to behold at closer range those giant forms of rock and ice. With the consent of Dr. De Filippi I organized a light caravan, with Whymper tents, little luggage and but few men and set out : Petigax, the unforgettable, accompanied me.

Even on our first excursion (November 26th to December 20th) we got rather far afield. We crossed the Indus on a big barge a little above Skardu, climbed over the rocks and sand of the Strongdokmo and soon reached Shigar. I need not repeat all that has been said about the fertility of the oasis, which is one bower of apricot-trees,

nor about the interesting old mosques, all scrollwork and open-work carving. At Shigar I made inquiries about the Braldoh valley and decided to make for the end of the Baltoro glacier—though what I heard was far from reassuring. They had had no snow as yet, and it was expected daily. I was bent on not waiting for it; for when it once begins in earnest the avalanches from the steep mountain-sides block up the valley —sometimes it remains blocked all winter long.

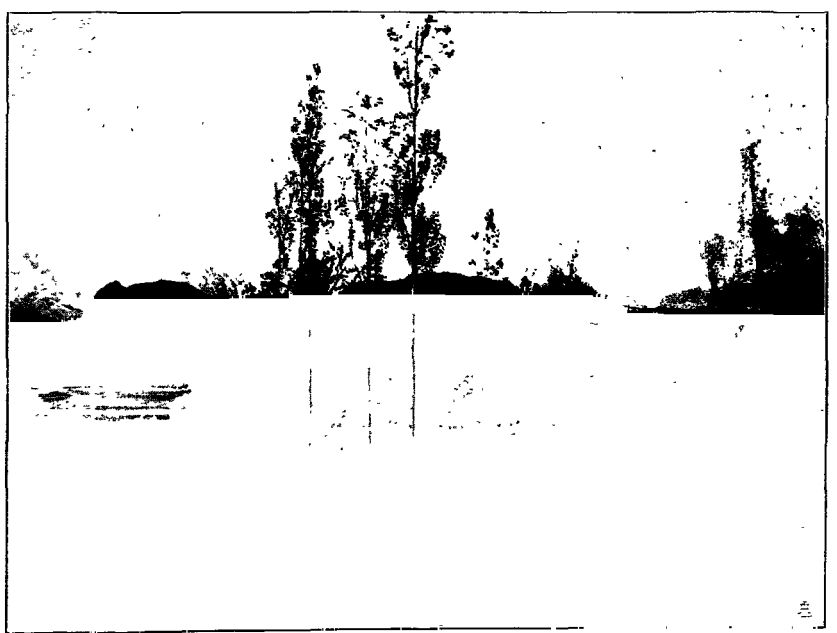
[*Phot. Dainelli.*

Leaving for the high valleys of the Karakoram.

The prospects were not too good; but having made up our minds Petigax and I began a race to get ahead of the threatened snow. We made double marches nearly all the way; but I carried out the usual geological observations, collected specimens and took photographs. We would reach the end of a day's march late in the afternoon, set up the tents and assemble the men of the village to be measured. The *lambardar*—a sort of mayor—helped me to make local researches into the correct pronunciation of the geographical names (I have extended this investigation to include the whole territory traversed by the expedition). Wherever possible I gathered notes

of local traditions which might later shed light on the migrations of the past. And often enough with tape and compass I went to take the measurements of some house. After dark I sorted my notes, collections and photographs; then there were the diary and correspondence. There is no denying that my days were full—but my strength was good and my enthusiasm great.

In my close and continuous contact with the men in the caravan and in the villages, I have always found the Baltis truly good and docile. When I measured them, the subject was vastly serious, but all the onlookers were no end amused. They showed no hesitation or recalcitrance—perhaps they had heard rumours of the muni-



Phot. Dainelli.

Balti house.

ficent sum they would receive: one anna, that is to say a penny apiece. A wretched sum? No, for them it was a day's wage, and earned without trouble. And when I went into their houses, to make a plan of them—and often without any ceremony—there was no gesture of protest, not the faintest discourtesy; even though I entered something inviolably private, as the house often is among Moslems. Indeed, here in the heart of the mountains, in these valleys far away from Skardu, I found less of the religious terror which Mohammedan women feel or affect to feel toward the infidel. There was no fanaticism, real or pretended.

They are interesting, these Balti houses—because they conform so precisely to

the dictates of the climate. Here at the bottom of the valley—where the villages are without exception situated—there is intense cold in winter and burning heat in summer. Therefore the Balti house has two storeys, one for the cold season and one for the warm.

The first is on the ground floor: a square of rough masonry, windowless, with one door opening into the stable, from which you pass into the sheep-fold and thence into the living quarters of the family. A hole, not too large, in the roof, serves as a passage for some of the smoke but admits little air or light. True, this dwelling does not conform to modern Western ideas of hygiene; but what a protection it affords against the cold! The first storey is the summer apartment; its walls are generally made of loosely woven branches, and the air circulates freely around and in and out of the little rooms.

All in all, the Balti houses are wretched indeed. In some villages, a little better provided with arable land, the buildings may be farther apart and better constructed. But where the soil is scarce, the houses are squeezed in anyhow, back to back, sometimes almost on top of each other, at the expense of all form, comeliness or elbow-room.

And yet, in my progress up the Braldoh valley, I came almost to envy the poor Baltis their houses! In my forced marches, my life of constant movement, I dressed much as I do at home between seasons; and there were some stretches, as between Chakpa and Pakora, where the path skirted an old alluvial slope, beside a series of little hot springs, and their warm vapours caressed me most agreeably. But at nightfall the cold got rather biting; I did not actually suffer from it, but it did interfere with my evening work. It was at such times that I found myself almost grudging the Baltis their houses.

At Askole we had the first snow. The day had been grey and leaden, the sky dark and lowering, the air still, save when from time to time a sérac fell with a loud crash from a little hanging glacier on the opposite slope. Next morning everything was white; but the sky was clear again. I had already made arrangements for the stages beyond Askole, which is the last village in the Braldoh valley; so I continued on my way, but always at double marches.

The Braldoh is probably the Karakoram valley best known to Europeans; not so much for the great Baltoro glacier as for the giant pyramid K^2, over 28,000 feet high, which has allured hither the best "ice-axes" in the world, already famous for their Alpine ascents: Conway, Guillarmod, Eckenstein, the Duke of the Abruzzi—who for years held the record of the height reached upon its neighbour, the Bride peak.

We crossed the great snout of the Biafo, scored with crevasses and rugged with needles; it flows down from its immense basin and fills up the entire width of the Braldoh valley. In the evening I picked up the tents at Burdomal; next morning betimes we were at Paiju, at the foot of the Baltoro. We had taken a long chance with the weather in coming; but we had our reward, for it behaved most sportingly. A flaw-

less evening displayed the imposing ridge of the Mustagh, in all the splendour of its monstrous precipices—I revelled in the sight. But the cold, like the clarity, was intense. Not that I actually suffered; but I ate my supper inside my sleeping-bag, and my bread, my meat, my jam were frozen, my tea was and remained a block of ice inside the thermos. Even the ink froze in my fountain pen, and I had to use a pencil. That evening the thermometer registered 3° F. inside my carefully closed tent, and my evening work became an impossibility. If only there had been a Balti house near by!

I stopped two days at Paiju, making my usual observations, and others on the snout of the Baltoro glacier. Then I turned homeward. Only the Domurdo retarded our march a little as it had on the way up; but we crossed it again without losing much time going round, as the caravans are obliged to do in the summer. I camped that evening at Korophon, at the foot of the Biafo glacier; next day we were once more at Askole.

We were just in time. It began to snow again, in earnest, and we hurried down the valley at the double, not to be snowed in. I retrieved the specimens I had left in the villages on the way up; collected others, took plans of houses, measured people; all this at top speed. And I got home safely—in other words, I reached the point where the Braldoh valley comes into the Shigar. But the appetite grows with eating; and it occurred to me that having come so far I might get a little farther. So instead of going down the Shigar I went up another valley, the Basha, and stopped at Chutrun.

We had to stop, for the snow kept falling and the sky promised still more; it would have been hard to march or to make observations, and I had all those from the whole Braldoh valley to put in order. So we stopped at Chutrun.

We were well shut in, both by the flanks of the mountains and by the thick grey clouds; but I have a lively memory of Chutrun. Indeed I may say that in the intervals of work in my closed tent, I enjoyed myself at Chutrun.

The name of this little village means "hot water" and it does in point of fact boast a thermal spring, which rises near by and flows into a square reservoir, perhaps 3 yards across and about 3 feet deep, surrounded by a tiny portico. Issuing from this, part of the water flows into a second tank with a rough masonry wall, the rest into a large ditch near the river. This last is the men's bath, the second is the women's, and the first is for "gentlefolk." It was the first, of course, which was put at my disposal. And never have I so enjoyed a sensation as that at Chutrun, bathing in the agreeable warmth of that water, while the snow drifted down in long slow curves and whitened my head. But even better fun was watching the men bathe. They spent hours on end in the water, chatting tranquilly, as though in a drawing-room. The boys would jump out to roll about nude in the snow, then in again to warm up. All day long bathers came from the whole Basha valley, from the whole Shigar valley and even beyond; both men and women. And each with a little bundle under his arm: a gift

for the tall priest who sat there enhancing by his prayers the healing quality of the waters or rather making capital out of them to wheedle something—if only barley, apricots or millet—from the faithful. The old hypocrite sent me a kid ; I countered with some biscuits and jam.

As soon as the snow held up a bit we were off up the Basha valley, where I still remember the little village of Bisil, because it too has a hot spring. Like the one at Chutrun and the others in the Braldoh valley, it is connected with the presence of a

[*Phot. Dainelli.*

Hot spring at Chutrun.

considerable stratum of crystalline limestone—of course not the same one everywhere, but wherever it recurs it represents the same geological layer in the midst of ancient crystalline strata.

From Bisil I went to Arandu, at the foot of the great Chogo Lungma glacier. It has a huge swollen snout, and is in a period of advance so marked, in fact, that it has already invaded some of the village fields and half-buried the mill. The inhabitants were terrified : it needed only a little to threaten the whole village with destruction.

They appealed to me. Well, I might know a little something about glaciers—but hardly enough to make one recede. I promised to mention it—to the Governor !

At Arandu I had my first chance to take some unhurried photographs of Balti women. They are not models of feminine charm. But their ornaments were interesting. Along the Indus and in the Skardu basin the clothing—of foreign material—is very bright-coloured; the ornaments are limited to silver beads and bars sewn in rows on the little black cap. Often a little filigree charm is worn as well. But in the more remote valleys—where, as always, the native costumes are best preserved—the women still wear wine-coloured garments of the native heavy woollen homespun, with

[*Phot. Dainelli.*

Snow in the Basha valley.

a richness of ornament which varies from valley to valley: at Arandu they decorate their breasts with disks of every size and material, and with great necklaces in which there is everything from turquoise and coral down to British uniform-buttons, from goodness knows where. It was of course not part of my ethnographic programme to make researches into the Balti costume. I simply jotted down what I saw, hoping that by the end of the expedition I might be able to draw some conclusions as to the interrelationship of feminine fashions among the diverse populations of these high valleys of the upper Indus.

It snowed all the time I was in the upper Basha valley. I went down to Chutrun again, where I met the Governor of all the trans-Himalayan possessions of the Maharajah

of Kashmir, the *waẓir-i-waẓarat* Hashmatullah Khan. I had met this official earlier in our expedition, and had perceived a fine intelligence behind his plain and almost timid exterior. Our meeting at Chutrun made us friends; I saw what a source of information he could be to me in my researches upon the natives, while he, perhaps, perceived that his own work might profit by a knowledge of my method of observation. Together we went back to Skardu, having struck up a friendship which we still carry on by correspondence. Both then and thereafter I greatly admired Hashmatullah Khan—who, though of noble birth was a "self-made man"—for the critical acumen he displayed in his researches upon the natives. He has in preparation a book which will be a useful contribution of interesting and reliable information.[1]

I on my side went on investigating too, and if the language obstacle made my harvest a smaller one, yet I did succeed in collecting some interesting pieces of information. I will mention one example. In one of the best books on this region, which came out some decades ago, appears the genealogy of the rajahs of Khapalu, who are made to go back to Iskander,—that is to no less a person than Alexander the Great. Well and good: it may be the tradition that that great general penetrated to the heart of Baltistan and gave his name to its principal city, Skardu from Iskandaria. But the genealogical derivation does not in the least correspond to the tradition. That Rajah of Khapalu who gave it to the traveller was merely doing a little boasting; his story has been handed on by successive writers, though with due notice of its improbability, and the other rajahs of Baltistan have found it easy to imitate the first one, until now all or nearly all of them will boast, in answer to questions, that they too can trace their descent from Alexander the Great.

But an investigation undertaken by my friend the *waẓir* proves the whole story to be a vainglorious fabrication. He had no difficulty in finding an entirely different family tree for the rajahs of Khapalu; while I myself took pains to collect all the stories I could find relating to these little Balti princelings, and all of them, in more or less legendary form, point to an origin in a district somewhat farther west, between Dardistan and Gilgit—precisely from the spot, that is, whence there have been actual movements of population certainly up to recent times. I am referring, of course, to the provenance of the Brokpas, which I have already discussed above.

I returned to Skardu with an ample harvest of lithological specimens, samples of water, anthropometric slips, house plans, and many full note-books of my campaign. Near Shigar I stopped to look for certain fossils which I knew were indicated for the locality; I found none, and I think I am safe in saying that there were none. The only Baltistan fossils I came across, then or since, were the few imprints gathered on the way up the valley of the Burji-la, between Skardu and the Deosai plateau.

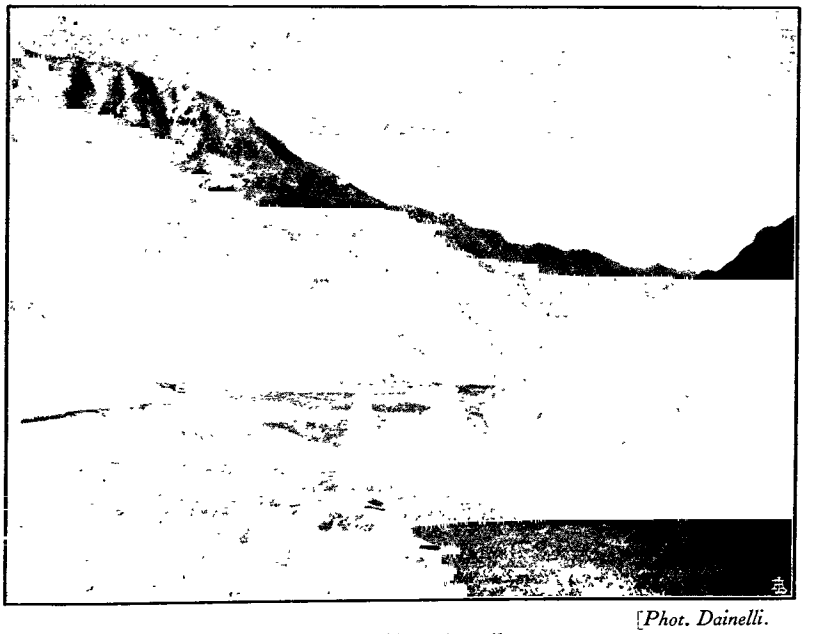
Hardly had I returned to the winter base when Hashmatullah Khan suggested to

[1] Hashmatullah Khan was also an invaluable and disinterested help to Prof Dainelli in his expedition of 1930 to the Siachen and Rimu glaciers.

me that we make an excursion up the Shayok valley and into those of its two tributaries the Saltoro and the Kondus. My chief approving the plan, of course I accepted at once. Petigax, with nothing to do at Skardu, was again to be of the party.

We should have left at once, but Christmas and New Year's Day were at hand, and we waited ten days, which gave me time, not to rest, but to put in order the harvest which I had reaped in the Basha, Braldoh and Shigar valleys. Also I made a few short excursions in the vicinity; and I continued to measure Baltis and Brokpas.

But directly the festival—which we celebrated to the best of our ability—was over, we set off, on January 2nd, in real winter weather, going up the Indus by the route



[*Phot. Dainelli.*

The lower Shayok valley.

we had followed a few months before to Skardu. Our first stage was uncommonly long; the march between Skardu and Gol is famous for its length, but we got beyond Gol to the point where the Indus and the Shayok meet, then we ferried across to the other bank and went on into the Shayok valley as far as Kiris. The porters had been sent on ahead and made the march in two stages; but even so some of them came in so late that I wondered what we should do that first night. It was a night that, in all my experience of Himalayan travel, remains unforgettable: for we were entertained by the Rajah of Kiris, and the loads were left ready strapped for the next day's march. And I—with my lively memories of the nights under the Whymper tent in the Braldoh and Basha valleys, and the cold we endured if not actually suffered—how I enjoyed

writing deep into the night, with my cases open about me, only interrupting my work to throw an armful of branches into the small fireplace or to watch the leaping crackling flame. I had felt before now a vague hankering after these native houses; now I appreciated them to the full.

True it was no ordinary house, this at Kiris; it was the palace of the local Rajah. I had a room to myself, with windows and a fire-place, bare but perfectly clean; my host received me most courteously and offered me sweetmeats made of butter and honey; in the evening there was a Lucullan feast. This was my real introduction to native life. I had had two meals at Shigar; but they were served in my own tent, where the prominent citizens of the place proffered succulent dishes and heavy sweets. Here the surroundings too were native, and our host sat with us at the table. But I took the precaution of saying that the meal must not last longer than an hour. For among Baltis and Ladakis it is not unusual to sit out the night at table!

Next morning there was a mosque to visit, at a little distance in the large oasis. It was different from any I had ever seen. Generally they are small square structures, with flat roof and modest portico; rather miserable in size and appearance. The three or four at Shigar and the one in the old fort of the rock of Skardu are unusual: they are square, but with a four-sided sloping roof above which others rise like a pyramid so that the result is something like a Chinese pagoda. The structural material is wood, for architraves, balconies and walls, with cornices of fine openwork. They are all very badly preserved, and probably go back to one of the first periods after the introduction of Islam into the region.

The mosque at Kiris differs from all these. In plan, I should say, it is like the most ordinary, the smallest and most wretched—square, flat-roofed, built of masonry with a portico in front. But by comparison it seems almost grand. The portico is supported by a close row of pillars, the interior is an ample space divided into naves by similar columns arranged with simple symmetry. On the floor are some straw mats, a few lamps hang from the ceiling. Nothing else—for the country-side, as I have said, is poor. But the mosque has another claim upon the interest: in that those who come to pray here are of two different sects.

In books about Baltistan and its people one often sees expressed surprise that the Shiah sect prevails there, when all the neighbouring Mohammedans are Sunni. The idea of a Shiah island is not immediately comprehensible, but the matter is simplified when one learns that it was a Persian who converted the Baltis from Lamaist Buddhism to Mohammedanism—a Persian who arrived hither by crossing a high pass of the Karakoram which brought him into the Saltoro valley and thence into the Shayok. And yet—how deceptive are appearances!—it was not the Shiah sect to which he, as a Persian, converted them, but the Nurbashi. And gradually all Baltistan became Nurbashi. Then, however, the local rajahs, observing that the Mohammedans of the oldest Kashmiri families were Shiah, became Shiah themselves out of pure snobbish-

ness; and the people followed them, for the same reason. But the inhabitants of the Shayok valley, where in fact the first converts were made, remained largely Nurbashi. And in the mosque of Kiris Shiahs and Nurbashis come to pray, in equal numbers.

We went up the great valley of the Shayok as far as Kunis, where we set up the tents—to convince me, as it were, that houses are better. It snowed, in fact, and was so cold that I had to take refuge in my sleeping-bag. From Kunis on, the tents were not unpacked for several stages, until I finally abandoned them, to be picked up on the return journey. Instead of camping I always found a lodging-place.

The first one, at Khapalu, was almost princely: in a large palace belonging

[*Phot. Dainelli.*

Ancient mosque at Khapalu.

to the Rajah's uncle, in surroundings extraordinarily picturesque, with a wonderful view over the whole of the leafy oasis, which climbs from the river up the gentle slopes of two immense alluvial fans. It is, perhaps, the loveliest oasis in all the region.

My activities were the usual ones: study of geological conditions, of morphological characteristics, reconstruction of the history of the glacial period; collecting specimens, making plans of houses, measuring people, investigating place-names and any legends or traditions that might bear on ancient or recent migrations. The region in which I was working was more or less inhabited; so after I began living in the Balti houses, my working day became much longer: it began at seven in the morning—earlier, as the season advanced, and generally speaking at sunrise—and never left off

before midnight. Often, indeed, it was one, or even two o'clock, before I finally crawled into my bag. It did not take long to go to bed; for more than a year I slept in my clothes.

From Khapalu I proceeded to the upper Shayok; and instead of following the bed of the river I crossed the great orographic terrace of Hanjore, at the back of the fine oasis of that name and stretching above it almost to the little village of Lunkha. Never shall I forget that early morning march: northward, beyond the deep and ample trench of the Shayok I saw running into it another valley, the Hushe,

Phot. Dainelli.

The best road, Shayok valley.

with a gigantic, wonderful mountain, a colossus of ice and rocks, at its head. This was Masherbrum, the other side of which overhangs the Baltoro glacier.

I returned to the bed of the river at Lunkha; and now the Shayok valley no longer had its former majestic sweep: it was narrow, tortuous, a deep furrow between high cliffs, sometimes terrifying to behold. The little villages cluster on terraces of medium size on one bank or the other; they grow more and more wretched as one goes on. And the roads are incredible—particularly that on the right bank, which I followed on my way back. Often we had to dismount and it took all hands to get the horses past the bad places, among steep and broken rock. Here and there the natives have built a ledge of stakes and branches and earth, a sort of hanging foothold across some perpendicular wall; in other places we had to clamber up the mountain-side and then

across very steep slopes of detritus, which end on a vertical wall hundreds of feet high. Sometimes we could go along the alluvial bed of the valley, beside the shrunken stream; or we marched upon the frozen river itself, as upon a highway; only we had to take care to avoid the danger spots where the ice showed bluish instead of an opaque white.

Chorbat is an important place—not because of the little oasis itself, but because it lies at the mouth of a valley which comes in on the left, by which one can cross to the Indus. It is the shortest route between the Khapalu district and Ladak, and has been used by various travellers. It has been a road for armies of conquest too: at the valley mouth are still the remains of a little fort which was put there to guard the pass—but guarded it rather badly, in fact, some 80 years ago.

It took us several more stages to get up the Shayok valley as far as Biagdangdo, the little village which is the last post, both ethnically and administratively, of Baltistan. Beyond it the valley grows narrower still, and is uninhabited up to the mouth of the great Nubra valley, which comes down from the Siachen, the largest of the Karakoram glaciers.

As I proceeded higher, I kept noticing Ladaki influence in the costumes of the Baltis, especially among the women. Turquoises became plentiful, sewn as ornaments on the little cap which was no longer black but a bright red like the typical *perak* of the Ladaki women. Like them too they wear a goatskin across the shoulder with the hair side in; and great silver rings in their ears—in which they resemble the Ladaki men. Their relations with the traveller seem to be normal: they do not run away or behave perversely, they are willing to be seen and questioned and will talk and laugh freely. I have seen several of them acting as porters.

At Biagdangdo I saw at close range my first Ladakis. One indeed, a merchant of some importance, I had met at Skardu, at a dinner given by Hashmatullah Khan in his beautiful bungalow. But these were, so to speak, more native and genuine: they were the heads of the Nubra district, come down to confer with the *wazir*. Also there was an old married pair, come hither to end their days. An appealing people, the Ladakis—but I will speak of them in their proper place.

We went back down the Shayok valley to Lunkha, and thence, instead of crossing the terrace of Hanjore a second time I kept on along the river to near the mouth of the Hushe and crossed a pass of moderate height into the Saltoro, which is its main tributary, returning thus into the heart of the Karakoram.

In the lower Saltoro valley, on the left bank, is the oasis of Pharon, interesting for some old mosques in the same style as those at Shigar, and some tombs of saints of the same type as the mosques, on a smaller scale. The chief of the village acted as my guide; he took me on a long walk in the fields and showed me some small remnants of masonry, his interest in which I was at a loss to understand, until he explained that they were the remains of the ancient crematory, dating from a time when these inhabitants of the Saltoro valley—who were indeed the first to embrace Islam—were still

Buddhist and burned their dead, as the Ladakis do to-day. Strange, that a structure so small and insignificant should have left traces of itself so long! Throughout Baltistan, however, and in Purig, and in regions farther to the west, one does come upon these traces of the ancient religion which have escaped the destructive zeal of the new proselytes to an iconoclastic faith. They are usually images of Buddha or of especially venerated Lamas or deities of the multifarious Olympus of Lamaistic Buddhism,

[*Phot. Dainelli.*

Winter pastures, Shayok valley.

carved in low relief and not without delicacy and grace, on some rock at a distance from human habitation. There are some also in the Skardu basin, on the Satpor valley side. But apart from these, which are true sculpture and authentic art forms, there are the graffiti, which some affect to despise: generally representations of animals, more rarely of men, with few and simple stylistic traits. True—as I have noted elsewhere, with reference to similar designs in Africa—schematic and conventionalized drawings of men and animals may equally well be attributed to contemporary artists in a primitive stage of culture and to the children of a highly evolved society, since youth

represents the simple, ingenuous and primitive phase in the cycle of human life. But when I see here alongside depictions of common animals others of species either rare or non-existent, or of horsemen armed with bow and arrows, or, above all, of *chortens*, the typical Buddhistic monuments, I am forced to the conclusion that these engravings too may possess a significance not very different in kind from that of more elaborate sculpture.

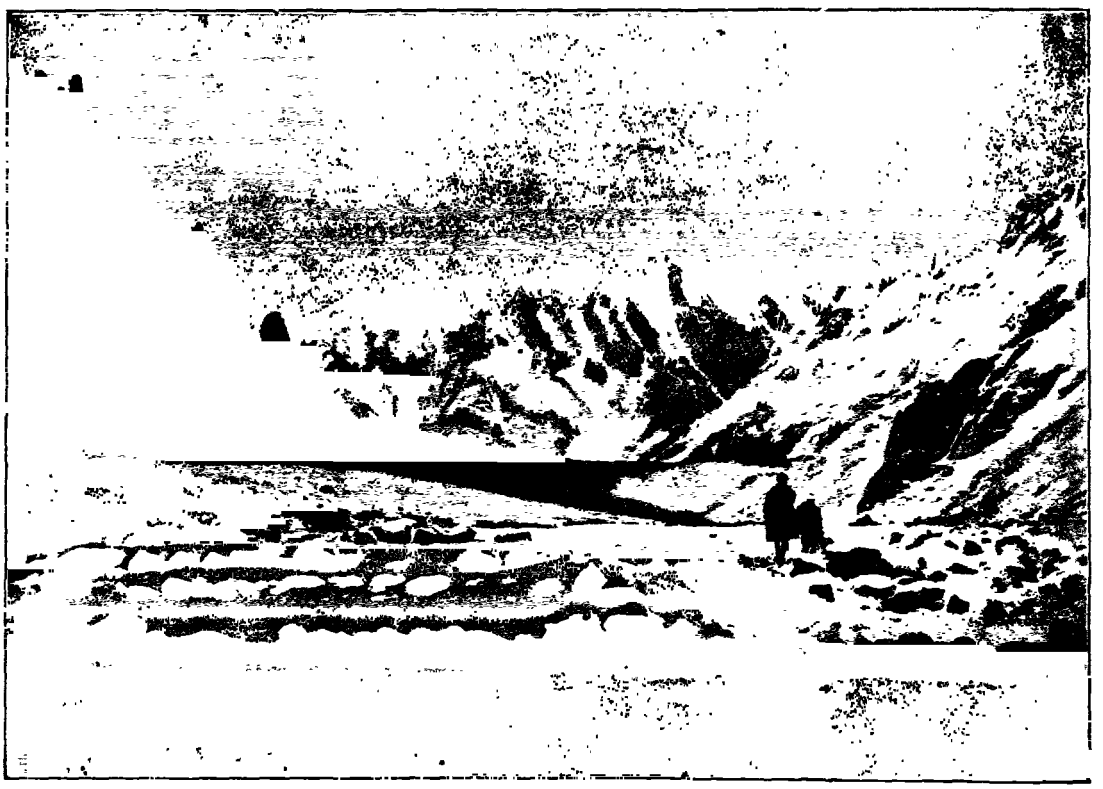
A little above Pharon the upper Saltoro comes down on the right and the Kondus on the left to their confluence at this point. I ascended both of them, the Saltoro to within sight of the glaciers of Bilaphond. The valley is no longer imposing ; it is rather like one of our Alpine valleys—and yet, what majesty those have ! The fact is, that here in the Karakoram any contours which can effectively be compared to those of our own mountains seem negligible in contrast to the inexpressible grandeur of the landscape as a whole. The scale here is so surprisingly greater that the eye, accustomed to other mountains and other measures, must slowly and gradually adjust itself before it can take in the scene, as a whole and in detail, and appreciate it at its proper value. The upper Saltoro, a valley relatively of secondary importance, does impress one as not larger than one of our own larger valleys in the glacial zone of the Alps—and one looks at it with a certain feeling of homeliness.

At the top of the Bilaphond glacier there is a snowy pass leading into the Siachen, the largest of the Karakoram glaciers. A villager of Courmayeur lies there, sleeping his last sleep—Petigax and I often think of him. The Bilaphond pass was crossed—one might say discovered—a few years ago by European travellers. But we often think we have made discoveries which in reality are not so. A *haji* from Tagas, who went up the Saltoro with us, told me that in his father's lifetime the natives climbed the Bilaphond glacier to the top, beyond which was still another pass whence they could go down toward Yarkand. A few days later other natives declared to me that the Persian who converted Baltistan to Islam got into the country by a pass at the top of the Kondus valley. This might be a legend ; but the *haji's* story refers to too recent a time for one to doubt it, especially when taken in conjunction with a fact which has been known for some time, namely that up to a few decades ago natives also crossed the Karakoram by both the Mustagh passes in the upper basin of the Braldoh valley. We know that in our own Alps many high ice-covered passes, now only used by mountain-climbers, were used by peasants either as trade routes or as normal channels of communication down to times which one cannot really call remote.

I descended the Saltoro valley and went up the Kondus to the Sherpigang glacier. Curiously enough it too, like the Baltoro and the Chogo Lungma, was all swollen at its huge snout, as though some great force were pushing forward the gigantic stream of ice. They are evidently all in a progressive phase. But there is the same contrast here as at Chutrun : not more than thirty or forty yards away from the glacier, at Korkundus, a little groove runs down the rocky left side of the valley, and great jets of boiling water gush out and steam hisses from many little crevices.

Korkundus is perhaps the poorest village I saw in my whole experience of the region. The houses are built in a single storey—no winter and summer quarters. There is room enough—but absolute misery; there was not even cleanliness. Perhaps that was why, that evening, I sat up late in the open beside a big fire, questioning the natives, especially the old ones, about ancient and recent local traditions.

At the Sherpigang glacier I marked the rocks close to the snout—I had already done



[*Phot. Dainelli.*

The Sherpigang glacier, Kondus valley.

the same at the Baltoro and the Chogo Lungma fronts—who would check my markings, after how many years? But I hardly think that the frontal oscillation of these huge frozen tongues of the Karakoram is very great—it is certainly less than one would expect from their size. I am inclined to believe that their very length tends to weaken—by the time they arrive at the front of the mass—those effects of climatic oscillation which produce the alternate advance and retreat of the tongue in the glacial valleys of our own Alps. And the very smallness of the climatic variation must affect them, for the farther one penetrates north-westward into this lofty continental mass, the smaller

is the quantity of precipitation—which is always in the form of snow. And it follows that the smallness of the variation is in precise proportion to the smallness of the precipitation. The snow-line rises considerably toward the north-east, that is to say from the outer ranges of the Himalayas toward the first Tibetan plateaux. The same applies to the snouts of the glaciers : the front of the Chogo Lungma is 9,600 feet above sea-level, of the Biafo 10,500 feet, Baltoro 11,000, Sherpigang 12,000, Siachen 12,150, Rimu 16,000.

I enjoyed my evenings, putting my notes in order and looking for the explanation of the facts I had observed during the day. When I had a good fire crackling near my little improvised table I could forget even the penetrating " odour of the East " that pervaded this poor house at Korkundus—it was as good as a palace to me.

And how many such palaces I saw—almost at the rate of one a day ! For when we went down the Shayok and the Indus on our way back to Skardu we took care, the *waẓir* and I, not to stop at the same villages as on the way up. We wanted new places and new people : he for his administrative investigations, I for my scientific purposes. So as we had gone up the left bank of the river we came back—as far as practicable —down the right; and along the Indus between Kiris and the basin of Skardu, where we emerged into that strange labyrinth of huge rocks and small arid valleys, near Strongdokmo, and arrived at length at our base ; where I found my colleagues talking of setting forth again—good news for such as I, " who cannot use one bed too long."

CHAPTER V

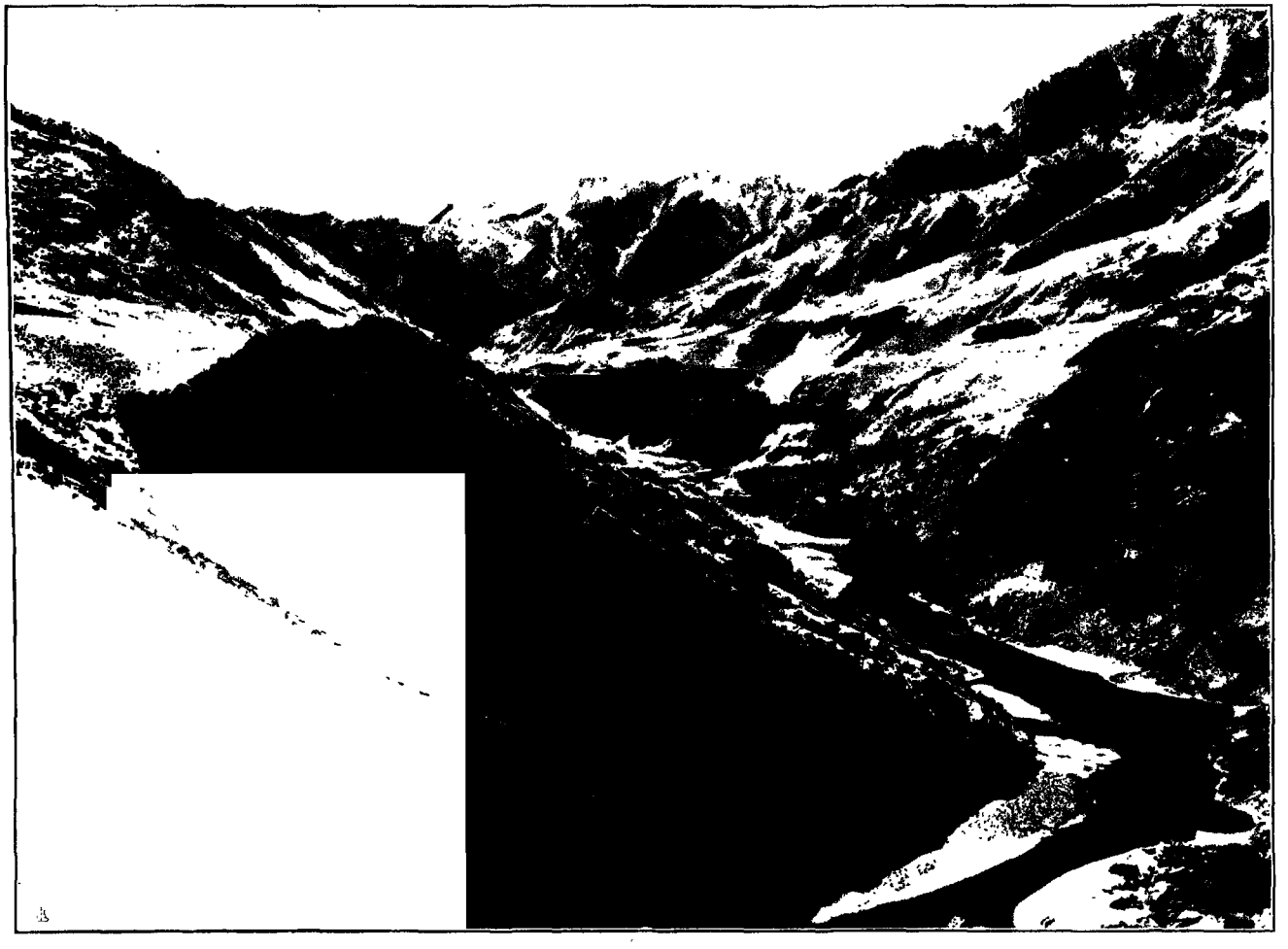
FROM SKARDU TO LEH

The Indus valley in winter garb—The frozen river at Karmang—The geophysical station at Kargil—Tibetan and Ladaki Buddhism, or Lamaism—*Chortens*, *mani* walls and prayer-wheels—*Gonpas*, or Lamaseries, and their temples—The sacred books—Polyandry—Mulbek—Namika-la—The Karbu valley—Fotu-la—The station at Lamayuru—The bridge at Kalatse—Temesgam, Rigzon, Alchi—Ladaki costumes—Likir, Bazgo—Ritual dancing by the monks at Phayang—The valley of Leh.

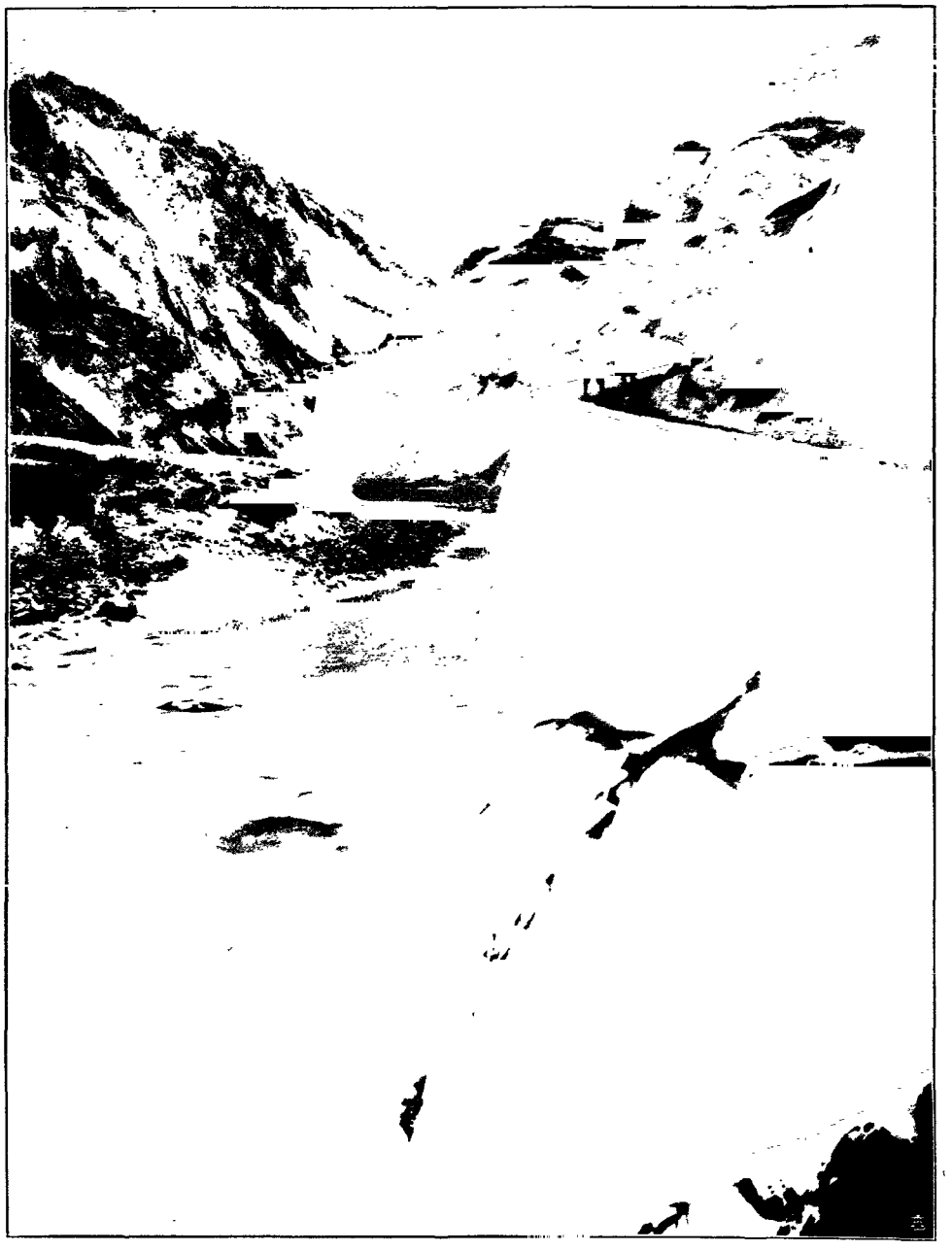
I RESUME the thread of my narrative. As we have seen, on February 16th our party left its quarters at Skardu, after a stay of nearly four months, and took its way up the valley of the Indus, the same route by which we had come down in October of 1913. We found plenty of porters, as work in the fields is at a standstill in the winter; and this was lucky, as we needed more than 300 of them, 150 to proceed with us and the rest to follow a few days later.

There was not much snow, but still enough to change the landscape completely. It had quite lost its typical look of stony barrenness, with bald rocks in every stage of disintegration, and was an ordinary alpine winter scene. But here the villages are built at the foot of bare and precipitous slopes where, in our own Alps, they would be brushed away in winter by the first avalanche; and this, together with the flat terraced roofs, is evidence of the scantiness of the snowfall.

For long stretches the road was free of snow; elsewhere it was covered with ice.



Winter in the Indus valley, below Parkutta.



Path along the Indus near Tolti.

On steep ascents and descents over spurs we had to unload the animals and lead them; they got forward with the greatest difficulty, slipping on their knees at every few steps. Where the road cut across the steep slopes we had to look out for stones rolling down from above; this danger would be greater later on; at present the stones were mostly frozen fast to the rocky walls. But one of the caravans which followed us did have a horse killed by falling stones and one of the porters had an arm broken.

But on the whole the trip was much pleasanter than in the summer; for then there is no relief from the intense solar radiation, and every afternoon one has to breathe an atmosphere laden with dust and sand carried by the periodical wind. In the winter the air is still and the cold not too biting. The Ladakis too prefer to do their trading with Baltistan in the winter months; there is a moderate traffic of little caravans with a few *zho* and small long-haired donkeys. There was more animal life, especially near the oases, than we had seen in the Skardu basin; but no great variety: slender iridescent magpies, doves, a species of crow with throat and wings of brilliant black and ash-coloured head and body; flocks of small birds and coveys of partridges.

At Karmang, four stages above Skardu, we found the Indus frozen from bank to bank for a short distance, not more than 100 yards. Yet the ice was thick enough to support crowds of people and even horses and the suspension bridge became for the nonce superfluous. It was on one of these ice bridges that the Sikh army of Zorawar Singh had crossed the Indus in the winter of 1840, at a point between Karmang and the confluence of the Shayok. They are said to have made the river freeze over in a single night by thrusting out branches of trees from the ice-covered shores to break the force of the current and dam up the pieces of floating ice.[1]

According to Francke [2] the Dards—who form an isolated ethnic group on the Indus above the confluence of the Suru-Dras—make ice bridges every year at convenient points by thrusting out a succession of tree-trunks to provoke the formation of ice, until a complete bridge is formed.

Some of us took advantage of the easy crossing to visit the picturesque castle of Karmang, perched on a sharp rock that dominates the village. It is quite abandoned and in ruins. The only noteworthy feature was a room with a loggia, the blinds of which are in fine lattice-work with geometric designs. Both the room and the loggia have carved ceilings with painted flowers.

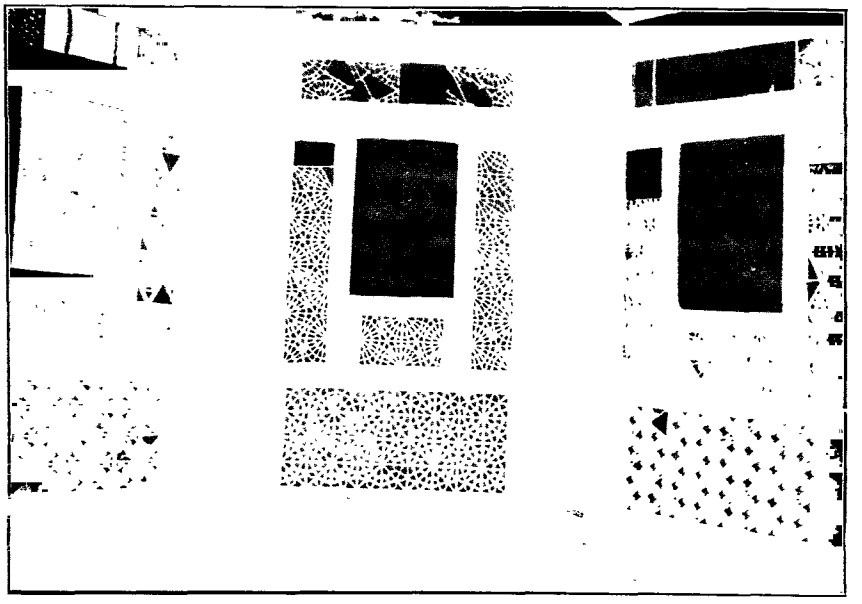
Long stretches of the Indus were still frozen both above and below its confluence with the Suru-Dras. Dainelli took advantage of the fact to reach a part of the valley above the confluence which is inaccessible in the summer and thus has hardly been

[1] See Cunningham, *op. cit.*, pp. 347–9 and A. Neve, *op. cit.*, pp. 249-50. The Rajah of Karmang told Neve (p. 275) that the army crossed the river higher up, near where it meets the Suru-Dras; but all accounts agree that it had proceeded much lower down on the right bank of the Indus and that the advance guard had arrived at Khapalu on the Shayok.

[2] Francke, *History*, p. 157.

visited by travellers.[1] The rest of us followed the regular caravan route, going up the Suru-Dras and then the Suru as far as Kargil, whence one returns into the Indus valley farther up, by crossing two secondary ranges.

No sooner had we rounded the corner at the point where the two rivers meet and turned into the tributary valley than we found ourselves in a different scene and climate. Snow fell in large flakes, and lay on the sides and tops of the mountains much thicker than we had seen it anywhere else in the Indus valley. At Kargil it was over 18



Loggia with pierced screens in the castle of Karmang.

inches deep. The heavier fall is doubtless due to the nearness of the Himalayas and the depression of the Zoji-la, and the influence makes itself felt as far as the ranges which separate the Suru valley from the Indus.

We reached Kargil on February 22nd, seven days after leaving Skardu. Kargil is a small village on the river, a little above where it joins the Dras, at a point where the valley opens out into a wide basin, almost entirely filled by alluvial terraces up to nearly 1,000 feet above the river-bed. The whole vast basin and its amphitheatre of mountains were entirely covered with snow, making a magnificent picture, which was much more impressive than the same landscape in its midsummer bareness.

The village lies on the right bank of the Suru, connected by an old sagging bridge

[1] Vigne (*op. cit.*, Vol. II, pp. 329–30) and Drew (*op. cit.*, pp. 262 *sqq.*) seem to have been the only Europeans who visited this part of the Indus valley before Dainelli.

with the unpretentious *baʒaar* on the other side. Above the latter, ranged on the hillside, are the *serai*, the post and telegraph office, a fine large bungalow, and a small house belonging to the *waʒir-i-waʒarat*. A little farther on, a tributary flows into the Suru from the east, and a big Dogra fortress stands near by, on the left bank. The *tehsil*, or prefecture, is on the right bank, approached by a suspension bridge in excellent repair.

We set up another geophysical station: it took 12 days for Alessio, Abetti, Ginori and Antilli to perform their observations, which they carried out to the end, despite frequent snowfalls and cloudy weather which made the astronomical and photographic work difficult and troublesome. Dainelli rejoined the party on the 28th, after the excursion in the Indus valley, which he will describe himself.

For my part I remained only two days at Kargil, taking stock of the provisions which had been collected in large quantities in the district. I arranged and numbered the loads and organized the transport, with the willing assistance of the *tehsildar*, Balakak Dar, a Kashmiri *pundit*. He was most anxious to show us hospitality; but the insuperable difficulty of caste did not permit him to get much beyond the good intention. When we received a formal invitation to tea at his house, we took him literally and sent our cook over to the *tehsil* with dishes and kit for tea-making and a bearer to serve it; we drank our tea seated round the table, while the *tehsildar* sat apart and looked on.

We had at Kargil, all told, 1,275 loads of provisions, each weighing about 70 pounds, or rather more than 40 tons in all. Another 150 loads were following us from Skardu, and all this material had to be transported to Leh (where the balance of the provisions was already stored) in midwinter, across two mountain passes over 13,000 feet high. Luckily we did not lack beasts of burden, *ʒho* and horses. Each of these carried three sacks; and with a proper division of the stages and spacing of the caravans so that we could use the same animals in rotation, everything was arranged—save for the unexpected obstacles which tend to keep one in suspense in this kind of organization.

On February 24th I sent ahead an instalment of 80 horses and *ʒho*; the next day I went myself, accompanied by another 70 beasts and 50 porters. Two days later another caravan followed with 150 animals; a week later, 220 porters—and so on.

Kargil is the capital of a district called Purig, lying between Baltistan and Ladak, chiefly inhabited by Shiah Mohammedans who are not greatly different from Baltis proper. Beyond it one enters a strange, new world: a Lamaist country.

Ladak [1] lies between Tibet proper, Kashmir and Baltistan, and extends as far northwards as the watershed between India and Central Asia, on the border of Chinese Turkestan. It is to-day politically united to Jammu-Kashmir; but in its social and religious customs it is really a part of Tibet, the two countries sharing, in every detail of public and private life, and in the system of religious oligarchy common to both, distinctive

[1] According to Cunningham (*op. cit.*, p. 18) it is La-tags in Tibetan, also called Mar-yul, or "red land." Desideri calls it Lhatayul or Second Tibet; other writers Middle Tibet or Western Tibet.

racial and cultural characteristics which differentiate them even at first sight from every other human aggregation. It is impossible to interpret these characteristics, even in the most superficial way, without some general idea of the religious system underlying them.

Buddhism was introduced into Tibet between the 7th and 8th centuries, probably by way of Ladak,[1] after it had spread for centuries in Central Asia and China, even penetrating as far as Japan. The original ethical and philosophical concept of Buddha had undergone such perversion as to be almost unrecognizable. As everybody knows, the primitive doctrine had consisted in grafting upon the fundamental Hindu dogma of reincarnation and retribution in successive existences the philosophic concept that life is suffering, the cause of suffering desire, and the extinction of every desire or passion the only way to attain to the final liberation from *karma* (action) and transmigration: in other words, annihilation. The monastic life was prescribed to men and women as a means of arriving at complete detachment from the illusions of the senses. Salvation was offered to all men, without distinction of caste or race; and this soon gave the doctrine a universal character which rendered it suitable for missionary propaganda and facilitated its rapid spread over Asia, while in India it had the effect of a profound social reform by contrast with the exclusiveness of Brahminism.[2]

But by degrees, and parallel with the development of theistic concepts in Hinduism, Buddhism too created a theocracy for itself, thus radically altering the original bases of its primitive doctrine, which were purely ethical and human. The new doctrines were consecrated in the school called Mahayana or the Great Vehicle, initiated as early as the second century of our era. Buddha was deified; indeed there arose the doctrine of innumerable Buddhas, dwelling in a multiplicity of worlds, complicated by a hierarchy of celestial Buddhas or Bodhisatvas. There developed a spectacular cult with processions, chants, music, incense and a rich liturgy for every deified being. The *chaitiya*, or *stupa*, the funeral monument, where the relics were deposited, became a shrine, and the monk a priest.

In the centuries that followed there was continued absorption of the worst features of Hinduism. Saktism was taken over, consisting in the exaltation and adoration of female divinities, each corresponding to a masculine divinity whose active principle they represented; and accordingly, to every Buddha was assigned his Sakti. But the most serious degeneration was the wholesale introduction of Tantric practices and doctrines.

[1] According to Cunningham (*op. cit.*, p. 356), Buddhism was prevalent in Ladak from A.D. 240, brought thither by missionaries from Asoka. As regards the introduction of Buddhism into Tibet and the characteristic form (Lamaism) which it assumed there, see the clear exposition of Sir Charles Eliot, *Hinduism and Buddhism*, Vol. III, Chapters XLIX–LIII; London, 1921. This is not the place to refer, even summarily, to the huge literature and bibliography existing upon the origin, development and subject-matter of Lamaism and its various sects.

[2] See, on the other hand, the reservations stated by T. W. Rhys Davids, in *Dialogues of the Buddha*: from *Sacred Books of the Buddhas*, London, 1910, Vol. II, pp. 96 *sqq.*

Lamaic pantheon in the temple of the fast at Tikse.

Tantrism is a school of magic which substitutes for prayer the compulsion of the divinity, who is obliged by the mysterious efficacy of the incantation to repay the sacrificial gift made to him; it has an immense congeries of esoteric rites, of magic and wonder-working formulas derived from yogism. Each letter of the alphabet has been assigned special relations with the powers of the Sakti, and certain groups of letters form the *mantras* or *dharanis*, the all-powerful incantations. Thus the syllables *om* and *hum*, meaningless in themselves, form part of the *om mani padme hum*, which is the *mantra* of the Bodhisatva Avalokita and the universal invocation of the entire Buddhist or rather Lamaist world.[1] The magic formulas "work" when pronounced or written over and over, or when the paper or cloth on which they are written is shaken mechanically—hence the prayer-wheels and the strips of stuff with cabalistic inscriptions that float to the breeze from poles and the roofs of houses.

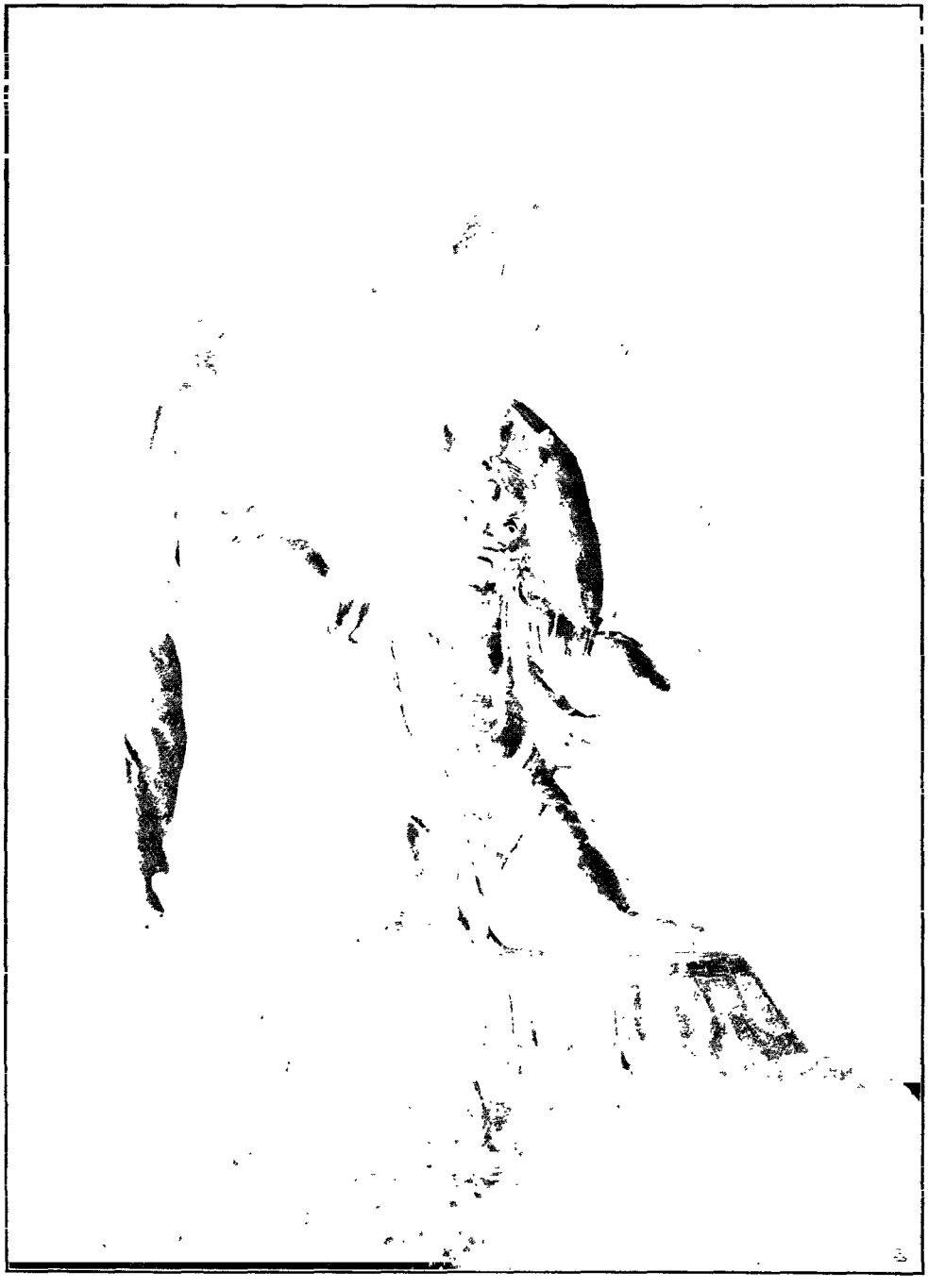
Buddhistic polytheism became an ordered system only between the 9th and 10th centuries. Three categories of Buddhas were definitely fixed, under a supreme entity called Adhi Buddha. They are the Djani Buddhas, the Djani Bodhisatvas and the Manushi Buddhas, with fifteen distinct divine personalities, five for each category. The most celebrated of the Bodhisatvas is Avalokita (Chenrezi in Tibetan), who is reincarnated in the Grand Lama or Dalai Lama of Lhasa. Among the Djani Buddhas is Amitabha, one of the most popular Buddhas of China and Japan, who is reincarnated in the second Grand Lama or Teshu Lama, who lives at Shigatse, the second capital of Tibet.[2] As for the historic Buddha, or Gautama, and Maitreia, who is expected to be his next reincarnation among men, they belong to the last or Manushi category.

In addition to these, Buddhism has taken over the whole pantheon of Tantric divinities. The tutelary deities might much more appropriately be called demons. Their images are monstrous and terrifying, and surrounded by a jumble of macabre symbols: bones and skulls and blood-stained human skins, serpents and flames; creatures with the heads of bulls or pigs or dogs or eagles. One goddess, called Lha-mo, is the protectress of Lhasa and of the two Grand Lamas; then there are the Devas, winged figures, genii of the air; the Nagas or genii of the earth, represented by serpents, protected by Vajrapani, god of the lightning and storm, and exorcised by means of their enemy, Naruda, king of the birds. Finally there are the Lha or half-gods, who are really mortals temporarily transported into one of the thirty-two places of delights. There are Lhas of the rivers and mountains and trees, Lhas of the houses and the family,

[1] The other words, *mani padme*, mean "the jewel of the lotus." Both the jewel, or precious stone, and the lotus are sacred symbols derived from Brahminism. The lotus is closely associated with the Buddha legend from its very beginning.

[2] Tsong Khapa, the great reformer of Lamaism, founder of the yellow sect, the so-called Luther of Tibet, who lived from 1347 to 1417, was also an incarnation of Amitabha; whence it has been said that the Teshu Lama is an incarnation of Tsong Khapa. He is venerated like the Buddha, and his statue is in many temples.

Tantric deity in the monastery of Himis.



Tantric deity, Himis.

like the Roman lares and penates. The local deities, however, are not so numerous as in India, where every district and almost every village has its own pantheon. Lamaism is a much more strongly centralized and rigid theocracy than Hinduism, and the same divinities and cult forms recur everywhere.

I cannot touch upon the complex and abstruse theology, the cosmogony, the systems of abodes of delights and of punishments, where mortals spend millions of years in pleasure or in torment in the intervals of their reincarnations.[1]

It must be said, however, that despite this enormous overlay of imported superstition there is still living a good part of the ethical code of the original Buddhism: such as the brotherhood of all living beings, and the universal fellow-feeling and mutual charity which are based on a recognition of man's common inexorable destiny, the eternal renewal of his troubles and pains through infinite cycles of reincarnations. This ethical basis has undoubtedly helped to mould the character of a people of whom Roero di Cortanze has written that " they are perhaps the sweetest and gentlest, the most honest and hospitable race in the world." [2] But one cannot fail to realize, on the other hand, that on the average man the element of magic and superstition exerts a deeper influence than the philosophic content of the religion, a state of things which of course is aided and abetted by the monks, who turn it to account, thus concentrating in themselves unlimited spiritual and temporal power. Every event, public or private, from birth to death, is regulated by rules and subject to rites and made matter for horoscopes, and so calls for the intervention of the monk, who is at once priest and soothsayer. Every circumstance is significant, for good or ill, and the ill can be obviated by the proper prayers and exorcisms. Also the possibility of acquiring merit and securing rewards in future incarnations is one that reaps the clergy generous donations.

The monasteries are in reality fiefs, with the appertaining rights and privileges. The monks belong to the two principal sects of Lamaism, the older being the " red-cap monks " (Nyingma), the younger that of the " yellow-cap monks " (Gelugpa), founded by the reformer Tsong Khapa. The red, or rather a sub-sect of them, are greatly in the majority in Ladak. There are no nunneries, as in Tibet, but a certain number of female attendants called *chumos* are attached to the most important monasteries, where they perform the tasks of servants.

At the head of every religious community is an abbot or lama,[3] who has spent several years studying in one of the universities of Lhasa or Shigatse in Tibet

[1] The narrative of Padre Ippolito Desideri is even to-day an excellent and complete exposition of the theosophical and religious system of Lamaism; see Puini's and F. De Filippi's editions. Among modern books, the most comprehensive is by L. A. Waddell, *The Buddhism of Tibet or Lamaism*; London, 1895.

[2] O. Roero Di Cortanze, *op. cit.*, Vol. I, p. 367.

[3] Lama from *Lam*, way, or also teaching, or to know, means master of the law. The title applies solely to the professed monks of the upper grades.

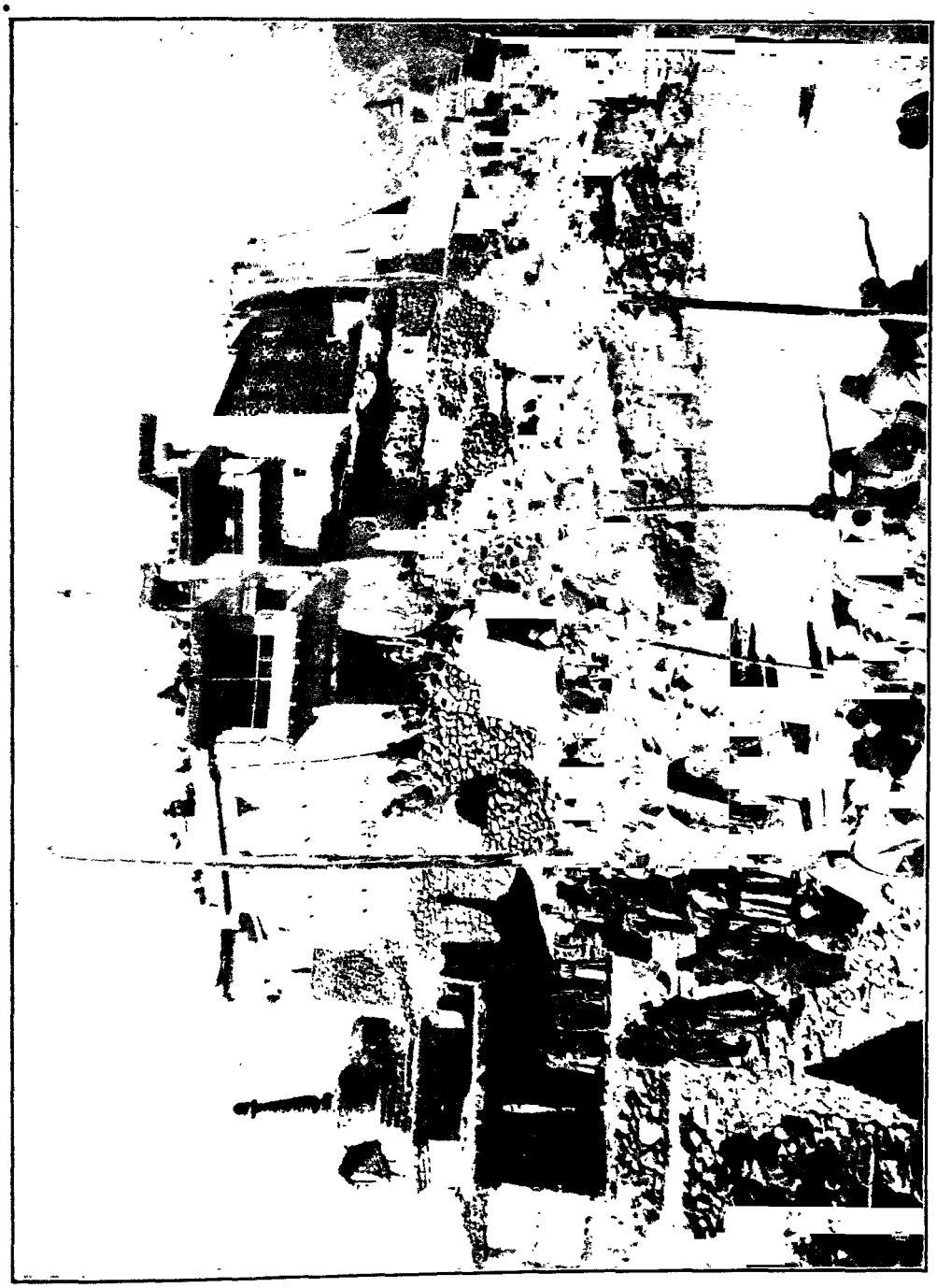
proper.[1] Some of the more important monasteries are governed by a *kushok*, an incarnation of some saint or master who attained a great reputation in the past. *Kushoks* are the objects of a veneration almost amounting to a cult. Under the abbot is a hierarchy of postulants, catechumens, simple and professed religious, with fixed offices and duties, which are defined by a highly detailed rule and discipline. And the entire

Chumos (seated group in foreground).

ecclesiastical body, both principal and secondary sects, is subject to the spiritual dominion of the Grand Lama of Lhasa, who is the actual pontiff of the Lamaist world.

From this feudal theocracy the whole country has received a singular stamp. The monasteries are castles and forts built, as a rule, on the tops or slopes of mountains, sometimes in spots which look quite inaccessible; the villages nestle at their feet, in true mediæval style. But the peculiar nature of this feudalism is shown by the

[1] There are no schools of theology in Ladak. A. H. Francke (*History etc.*, p. 67) says that from the beginning of the 14th century the novices have been educated in Tibet. This was also the case at the time of Desideri (Puini, *op. cit.*, p. 31; De Filippi ed. p. 78). Sven Hedin (*op. cit.*, Vol. I, p. 358) found at the university of Teshilhumpo at Shigatse students from every part of Ladak.



Monastery of Phayang.

profusion of religious symbols and features which are found not only in inhabited sites but scattered throughout the country-side, to which they give a character absolutely unique.

The most striking among these are the *chortens* and the *mani* walls which one sees along the road, in the middle of the country, and as a rule at the entrance or exit to a village. The *chortens* are also scattered among the houses as well, in the courtyards and on the terraces of monasteries, and inside the temples.

Chortens are pyramidal structures on a square base, which is sometimes decorated on its faces with stucco bas-reliefs representing winged genii, chimeras, dragons, or merely geometrical lines. This base diminishes by four or five high steps up to a narrower stage upon which rests a sort of cupola or truncated cone, surmounted by a low pinnacle shaped like an ear of maize, ornamented with circular reliefs,[1] and ending in a symbol which looks like a crescent, within the sickle of which is a globe with a tongue of flame above it.[2] The description is valid for the few *chortens* which are still intact; most of them are in a more or less advanced state of decay, lacking either the symbol, or the pole which holds it, or even some part of the cupola.

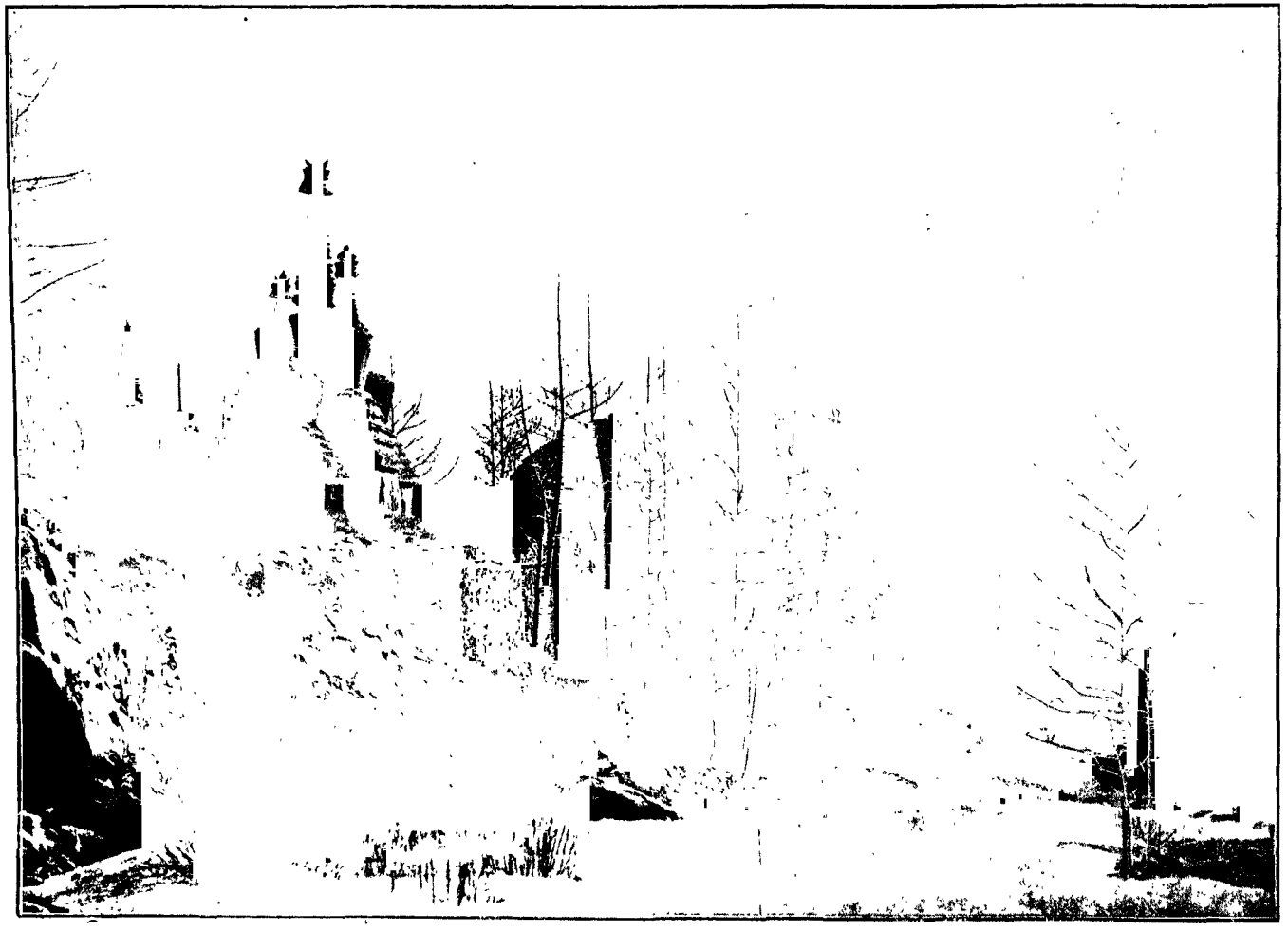
These monuments are without doubt derived from the Indian *chaitiya* or *stupa* originally intended to hold relics of the Buddha.[3] They have taken on under Lamaism a variety of uses and meanings. Some contain the ashes of a lama incarnated or venerated for his holiness, and these are called *dunga den*; again, they may be cenotaphs built by a well-to-do family to the memory of one of their deceased; still oftener they are simply Buddhist symbols without particular significance. They are of all sizes. Little ones a few inches high, made of silver or of gilded metal, stand among the vessels and lamps before the altars; others 6 or 8 feet high, covered with beaten silver, perhaps inlaid with coral and turquoise, are set up in the temples on altars of their own; and lastly there are the out-of-doors ones, built of masonry, about the country, near the tombs, among houses and villages, in the courtyards and on the terraces of the monasteries. Some of these are 3 or 4 feet high, some 30, some 60 or 70, with bases proportionately large, not infrequently placed astride the road, so that one passes through a portico in the base. They stand singly or in groups, sometimes three together painted in red, blue and white, the symbolic colours of the spirits of earth, sky, and water; or they are arranged in long rows on a common base, 108 of them, like the beads in the Buddhist rosary and the number of volumes in the Lamaic canons (*Kahgyur*).[4] The

[1] According to C. M. Enriquez (*The Realm of the Gods*, London, 1915, p. 165), the steps represent the five terraces of the sacred mountain Meru, the fabled seat of the various paradises; the rings round the pole surmounting the cupola stand for the 5 to 7 and 9 storeys of the three palaces of Buddha.

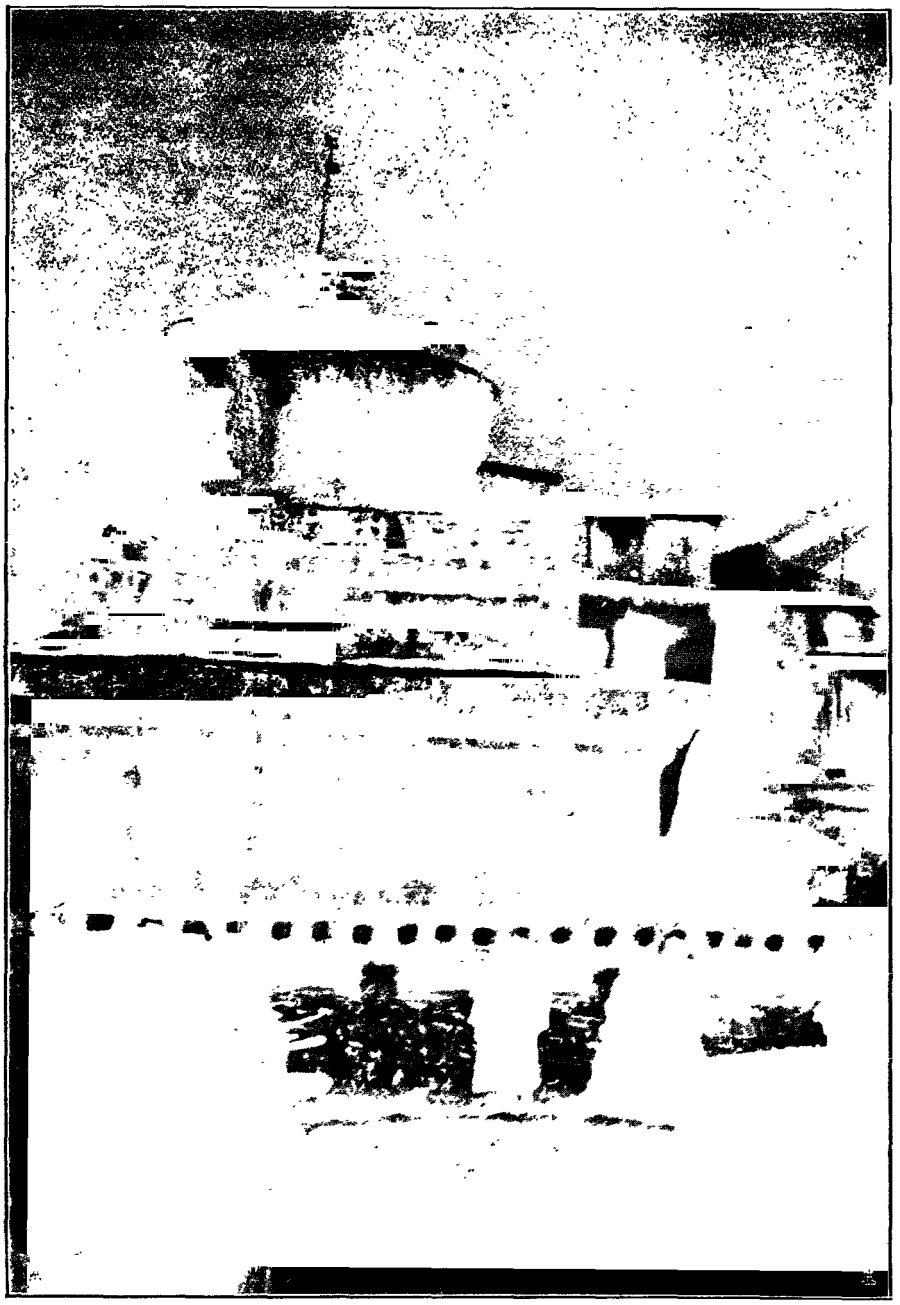
[2] The symbol is a monogram of the root letters of the four elements: earth, air, fire and water. See Cunningham, *op. cit.*, p. 377.

[3] See on this subject the very full monograph of Cunningham: *The Bhilsa Topes*, etc., London, 1854.

[4] It is strange that 108 is also the number given by common consent in India to the number of existing Upanishads.



Group of *chortens* at the entrance to the Himis valley.



Chorten with bas-reliefs at Lamayuru.

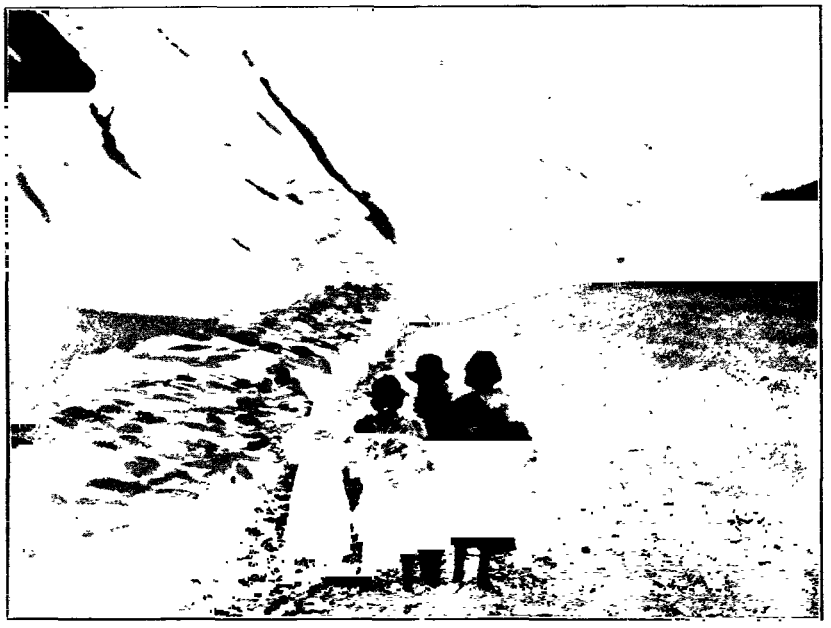
construction is solid, either in one block of masonry or else containing a little chamber in the base—or oftener in the cupola—with an opening holding innumerable little strips of paper or birch-bark bearing the sacred formula *om mani padme hum*; likewise tiny little clay *chortens* or small clay medallions stamped with a divine image, a *chorten* or an inscription. The clay is kneaded with the ashes of some holy lama and thus restores to the monument its character of reliquary. Some of the *chortens* have a little tabernacle on one side, either open or with a grating, holding a statuette or bas-relief of a divinity; others have rows of niches, into which are fixed prayer-wheels—of them more later.

Chorten with doorway, Lamayuru.

Then there are the so-called *mani* walls.[1] *Mani* means stone, also in the sense of precious stone. The walls are solid masonry affairs, either dry or cemented with mud, 4 or 5 feet high, with the top sloping slightly in both directions, like a gable. They are sometimes as much as 10 or 15 feet thick, and vary in length from a few yards to half a mile and more, when they look like great dikes or causeways stretching across the country. The two slopes on either side of the ridge are covered with flat stones like tiles: pieces of slate or polished pebbles, each of which bears a clearly cut formula, nearly always the Lamaic invocation *om mani padme hum*. These are the votive offerings of every class of the population: propitiatory gifts from those going on journeys, or desiring the birth of an heir; for the success of the harvest, the safety of the flocks, and so on. They are sold by the lamas, who manufacture them in large quantities. The largest and most important *mani* walls often have a large *chorten* at each end, sometimes in the centre as well. Others have a larger stone slab on top, with a carven image, sometimes coloured; this may also be enclosed in a little shrine, or in a niche built in the wall itself.

[1] According to Francke (*History of Western Tibet*, etc., p. 97) *mani* walls are of relatively recent appearance, being the work of the famous lama Stagtsang Raspa, between the 16th and 17th centuries; but they have invaded the entire country and are not less prominent than the *chortens*.

The *mani* walls are usually interspersed among the *chortens* along the road, at the entrance and exit to a village; but there are some in the heart of the country as well. It is an inviolable rule that in passing them or the *chortens* or any religious monument, you must go to the left, and keep them on your right hand. Therefore the road always bifurcates at a monument, so that whether going or coming you can still keep on the left side of it. The rule goes back to one of the most ancient rites of Buddhism, the circumambulation of sacred places and buildings, temples, monasteries, cities (Lhasa), moun-



Phot. Spranger.

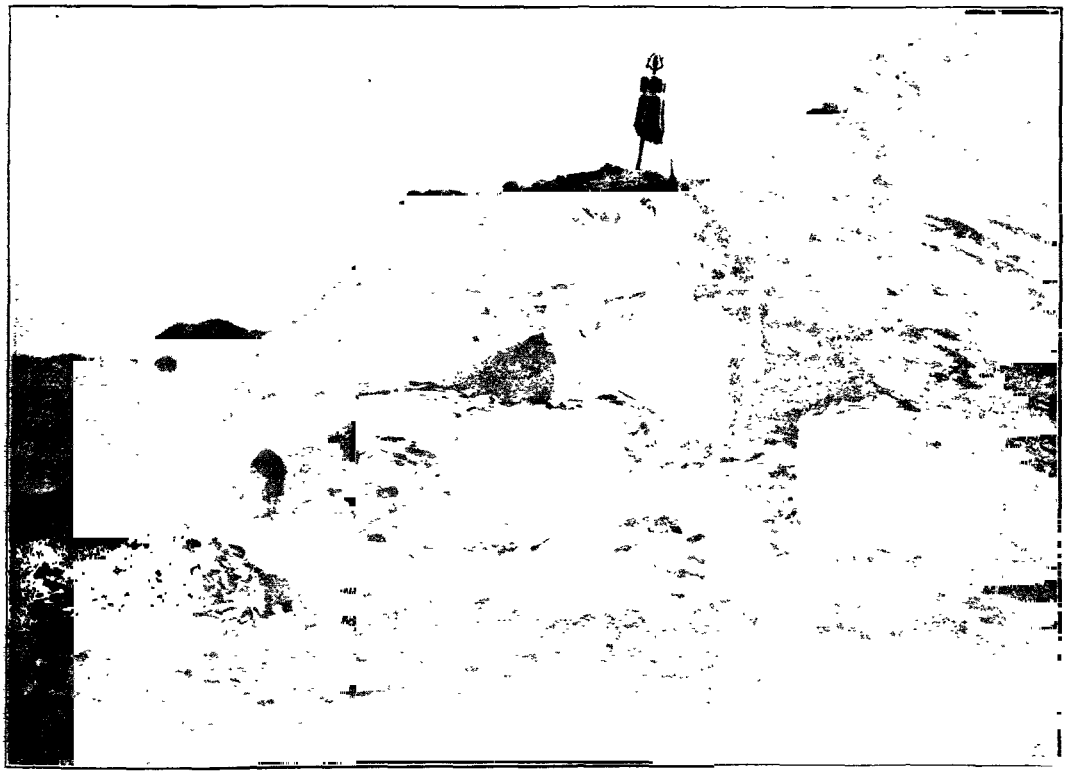
Mani wall near Lamayuru.

tains, lakes, etc.; which must always be performed from left to right, as the sun moves.[1] The rite is performed either by walking or by measuring the earth with the body (*koram*)

[1] This rite, as well as the Buddhist symbol of the wheel, has been made to derive from a solar cult. See W. Simpson, *The Buddhist Praying Wheel*; London, 1896, pp. 87 *sqq.*, where he also makes interesting comparisons with similar Mohammedan, Hindu and Christian rituals, etc. There is perhaps a simpler explanation for the rule: it may be a case of considering the right side as the position of honour and respect. Various passages in the Nikaya, or Dialogues of Buddha, which with the Pitaka are the oldest existing documents of Buddhist doctrine, seem to show both the remote antiquity of the practice and its derivation and preservation in the Buddhist ritual. In many of the dialogues, when the interlocutor, the disciple or neophyte takes leave of the Blessed One, there is express mention of the ceremonial practice of keeping him on one's own right in passing him. See Rhys Davids, *op. cit.*, Vol. I, pp. 95, 185, 289; Vol. II, pp. 90, 91, 102, etc.

in a series of uninterrupted prostrations; it is accompanied by prayers, and constitutes a spiritual performance somewhat akin to the Christian *via crucis*.

At every step of his road the wayfarer's thoughts are directed heavenwards: by the inscriptions cut in large letters on any suitable surface of rock; by the sacred formulæ written in a mosaic of white stones fixed among the detritus covering the bare mountain-sides and visible for miles; by the Buddhist symbols, the wheel, the ladder, the fish,



Lhato near Tikse.

the intestines of Buddha (represented by a key pattern), the swastika or mystic cross, cut on some cliff along the route. From time to time one sees also isolated shrines, dedicated to some local deity (*lhato*).

But the passion of the Ladakis for stone monuments manifests itself in simpler ways as well. They will pile up little stone cairns or set up single stones, the pointed shape of which pleases their fancy, on any isolated boulder in a valley; and of course the habit well known among primitive people of building cairns on mountain passes is of very general application in a country like this, where almost all the roads cross mountain ranges. Every pass has its heap of stones carried up one by one. Often the horns

of animals are piled at the top; and poles and branches tied with strips of stuff printed with the sacred formula, the flapping of which is equivalent to its oral repetition.

This substitution of movement for repetition finds its strangest application in the prayer-wheels.[1] Almost all the religious one sees on the way, and even some of the better-class laity, hold by the handle a little cylinder revolving on a metal rod. This they whirl industriously with a slight motion of the hand, aided by a small weight fixed to the outer edge with a chain. Inside the cylinder are tightly rolled layers of strips of paper, birch-bark or soft leather, upon which the sacred formula is written in minute characters as many times as possible. They are always whirled clockwise, from left to right, and by each revolution one acquires as much merit as by repeating the formula as many times as it is written on the strips within.

It is not hard to imagine the extravagances to which the practice has led. For there are not only portable wheels but fixed ones, set in niches in the walls of temples and of *chortens*; or sometimes in rows of dozens along the road, protected by a roof. The passer-by puts these in motion one after another with a touch of the hand. Such wheels are 3 feet or more high and proportionately large round.[2]

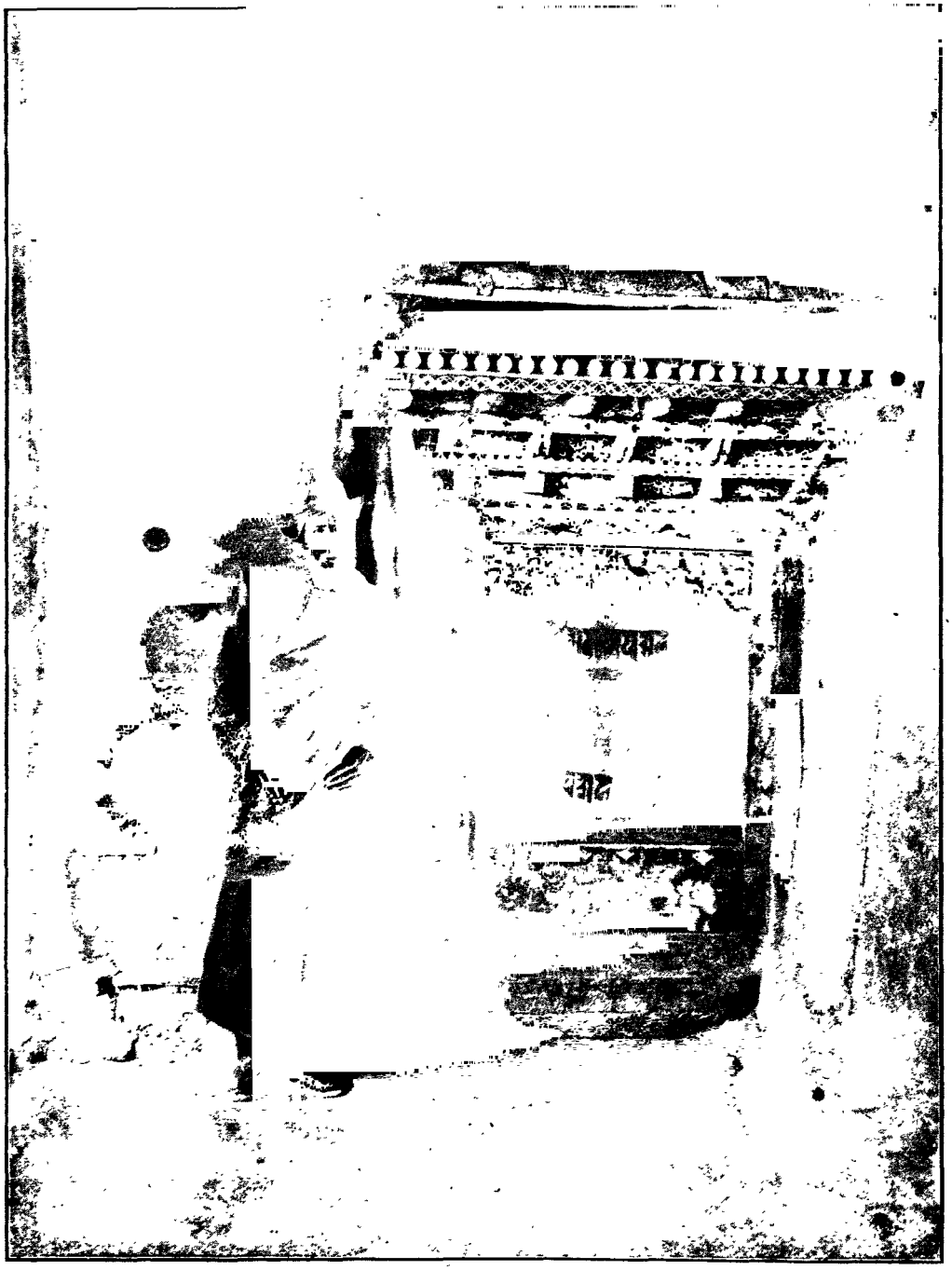
Up to this point the suppliant has had at least to move his hand. But the ingenuity of the clergy has found ways of delegating to mechanical forces even this slight action. There are prayer-wheels mounted on axles with blades set in motion by a stream of water; others in which the wind supplies the power, and the axle has rays ending in spoons, like an anemometer—such contrivances are of course set up on heights.[3]

[1] These are also called *mani* (*mani korlo*), like the walls of votive stones and all the other symbols which refer to the classic invocation. On the subject of that famous six-syllabled magic formula, the *mantra* of Avalokita, *om mani padme hum*, see W. Woodville Rockhill, *The Land of the Lamas*, Appendix, p. 326. It has been said (for instance by Enriquez, *op. cit.*, p. 168) that none of the Buddhist utterances is a prayer or petition in the sense of asking a favour or protection, but rather a simple invocation, more like lauds. This is, in fact, the literal significance of the *mantra*: "O the jewel in the flower of the lotus." But when the Ladaki patters his *om mani padme hum* while wading a swift torrent, or when overtaken by snow on the mountains, he is like every other human being who instinctively seeks help and protection from something which can control the forces of nature; just as the frightened woman makes the sign of the cross at a flash of lightning. In both cases the prayer and the invocation mingle. But when the formula is said at the end of a journey, or on reaching the top of the mountain ridge and depositing one's stone on the votive heap, then it seems it must possess a strong element of gratitude and thanksgiving.

[2] Miss Gordon Cumming saw cylinders in Japan large enough to contain the books of the canon. Gilmour saw in China a wheel over 60 feet high, containing altars, images and books; he also describes a whole collection of the sacred books arranged in an 8-sided rotating pillar, which must have been something like a revolving book-case (cited by Simpson, *op. cit.*, p. 21).

[3] M. Huc, *Travels in Tartary, Tibet and China* (translated by Hazlitt, and cited by Simpson, *op. cit.*, p. 19) describes prayer-wheels suspended above the hearth in Tartary and set in motion by the ascending hot air. Rockhill also saw them in Tibetan houses at Koko-nor (*Geog. Jour.*, Vol. III, 1894, p. 363).

Prayer-wheels in the temple porch, monastery of Likir.



Great prayer-wheel in the monastery of Tikse.

I cannot tell whether this fragmentary description of the religious practices of the Ladakis will suffice to give an idea of the religious obsession in their lives. Private houses vie with monasteries in the display of every sort of symbol to catch the eye. The corners of the flat-roofed houses are surmounted by bundles of juniper-twigs, bound like fasces with strips of white stuff, sometimes with a vertical band which crosses the others in the form of a cross. Often one sees on a house-corner a sort of furnace in the shape of a terra-cotta jar with an opening at the base and fresh juniper-boughs burning inside it, giving out a pungent smoke. And along the terrace on the side overlooking the street cords are stretched or poles set up with banners and strips of cloth bearing the sacred mottoes. The villages have perpetually, to a Western eye, an air of being *en fête* for their patron saint.

Every village, as I have said, is dominated from a neighbouring height by a *gonpa* or monastery. These are monastic cities, a collection of tiers of roofs, on the slopes of some height or steep mountain-side. The houses are almost on top of each other, the roof of one house forming the courtyard of the one above it; they are connected by a labyrinth of passages, corridors, ladder stairways and trap-doors, or by narrow lanes with here and there an open court. The small houses of one or two rooms, where the monks live, are huddled round the larger buildings, such as the abbot's house, the temples, the reception and lecture rooms, the library, the treasury, the chapels for the cult, those dedicated to the dead, the store-houses, the kitchens, and so on. These more important structures are usually plastered and whitewashed; and the houses of the head Lamas, above the basement wall, have windows opening on wooden balconies whence there is generally a beautiful view over the country beneath. The temples and religious buildings are decorated with a wide red stripe round the window-frames. In the courtyards and at the corners of the terraced roofs tall poles are a-flutter with the sacred mottoes; there are *chortens* of every size, and juniper-boughs bound up in sheaves, and the little furnaces which I mentioned above; and at every corner and along the walls prayer-wheels are fixed, singly or in long rows. The monasteries are often surrounded by walls and fortifications in a more or less advanced state of decay, which, like the ruined forts scattered throughout the country, bear witness to a long history of wars and uprisings.

The internal design of the temples is of two types. In the first a square central space is surrounded by wooden pillars which run up through the roof and support a second, smaller roof like a pagoda. There are no windows and light enters through the space between the two roofs. The second type is the basilica, with two lateral naves somewhat lower than the central aisle.[1] In both kinds, the sacred images are ranged along the wall at the back. They are usually statues, sometimes of colossal

[1] That medley of information about things Tibetan, the *Alphabetum Thibetanum*, by the Augustinian friar Antonio Giorgi (Propaganda Fide, Rome, 1762, p. 407) gives a good plan of the larger temple at Lhasa, which is of the basilica type.

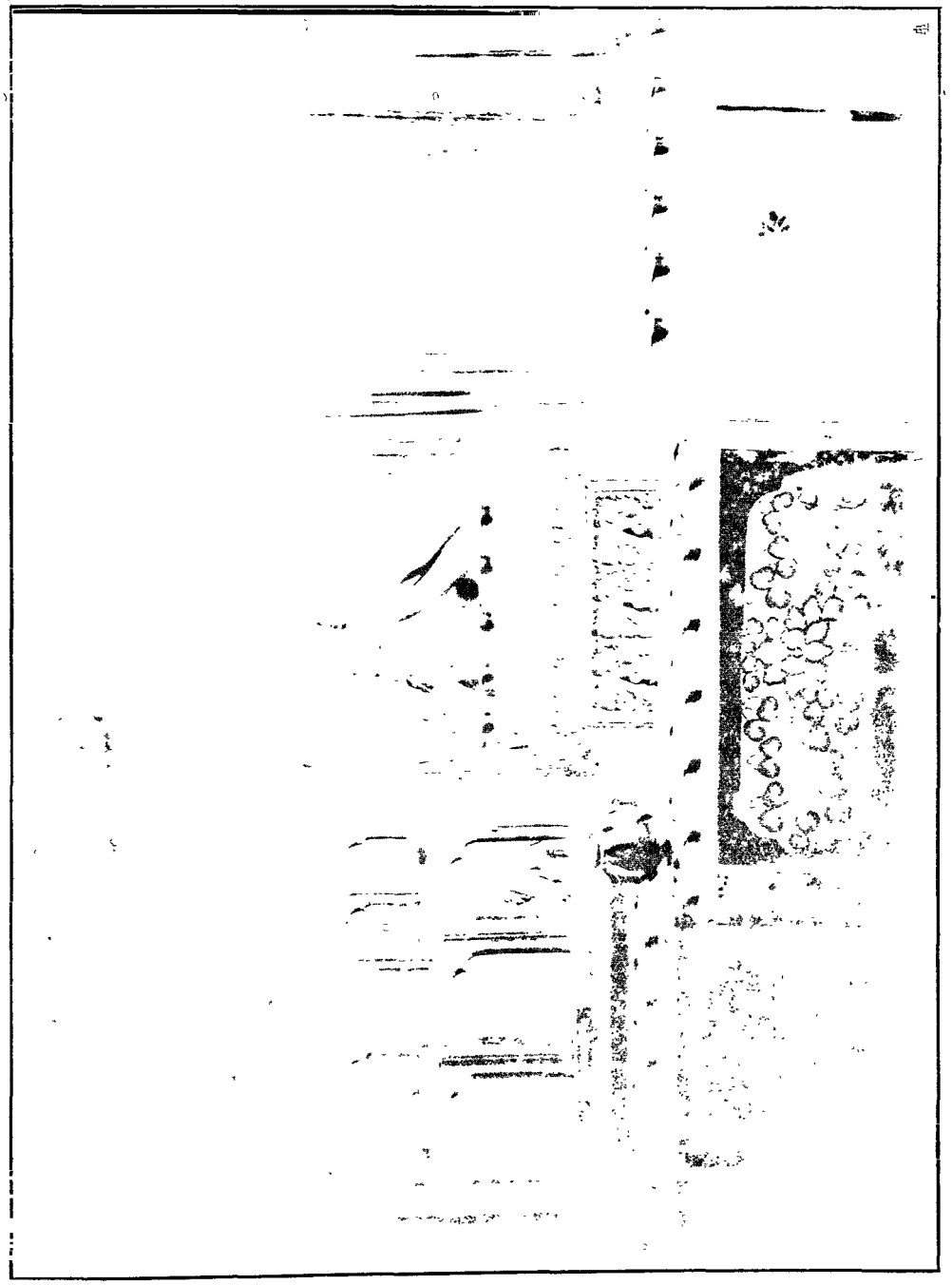
Colossal seated statue of Chamba in the Red Chapel of the Namgyal Tsemo, Leh.

size, representing Buddha, Amitabha, Padma Sambhava, Avalokita of the eleven heads and eight arms, the reformer Tsong Khapa, and the rest; generally clad in rich but dingy garments. Then there are the "frightful divinities" usually hidden from view behind a thick veil. Sometimes the statues stand in separate niches, either open or grated. Before them stand low tables of coloured lacquer, with the vessels for the offertory, chiefly bronze or silver cups and bowls full of melted butter upon which floats a blazing wick; little basins for water, grain, fruit and flowers, and cones made of barley flour (*satu*) kneaded with butter. In the spaces between the wooden pillars hang numerous *tankas* or standards of paper or waxed cloth, with the illuminated image of a saint, framed in silk or Chinese damask. The side walls also are occupied by smaller shrines or covered with mural paintings; and on the right wall is often a set of pigeon-holes containing the many-volumed collection of the sacred books. The abbot's throne and some seats for minor dignitaries stand in front of the row of statues; and there is a free space in the centre of the temple, between the rows of low cross-benches where the monks squat during the offices. Here and there are other low tables containing the apparatus of the cult: the *drilbu* or little bell, the *dorje* or sceptre, which is the *vajra* or thunder-bolt of Brahma or the sceptre of Siva, the vessels for the holy water (saffron water), which are shaped like coffee-pots, surmounted by a tuft of peacock feathers which serves as aspergillum; the censer, swinging suspended from three little chains, just like that in the Roman Catholic Church, the double tambourine and the great spiral shell from the Bay of Bengal, which calls the monks to the daily occupations ordained by their rule. Lastly there are the musical instruments: the cymbals, the large disk-shaped drums mounted on a support, the very long trumpets, the clarinets. The utensils used for the cult are objects of veneration, like the deities themselves.

All these things are usually elaborately ornamented, and in form, finish and decoration are often objects of artistic value. The metalwork, hammered or chased, is particularly noteworthy; there are geometric motifs, or leaf patterns, or dragons, oftener the designs are drawn from Buddhist symbolism or the letters of the magic *mantra*. Fine effects of colour contrast are obtained by the use of two metals, silver with gold, silver with bronze or copper, copper with brass; also by the free application of coloured stones, turquoise, cornelian, agate or coral, inlaid in the metal with the perfection of the goldsmith's art. Many of the standards or *tankas* are highly valuable, and are comparable with the finest of our illuminated manuscripts. And among the statues there are some which are striking for the good modelling, the fine proportions and the life-likeness of the expression and posture. In the statues of the tantric divinities the fantastic element has freer scope, and coupled with a lively power of representation succeeds in creating images which for their terrifying aspect and satanic ferocity are second to nothing in the pictorial demonology of the Middle Ages.

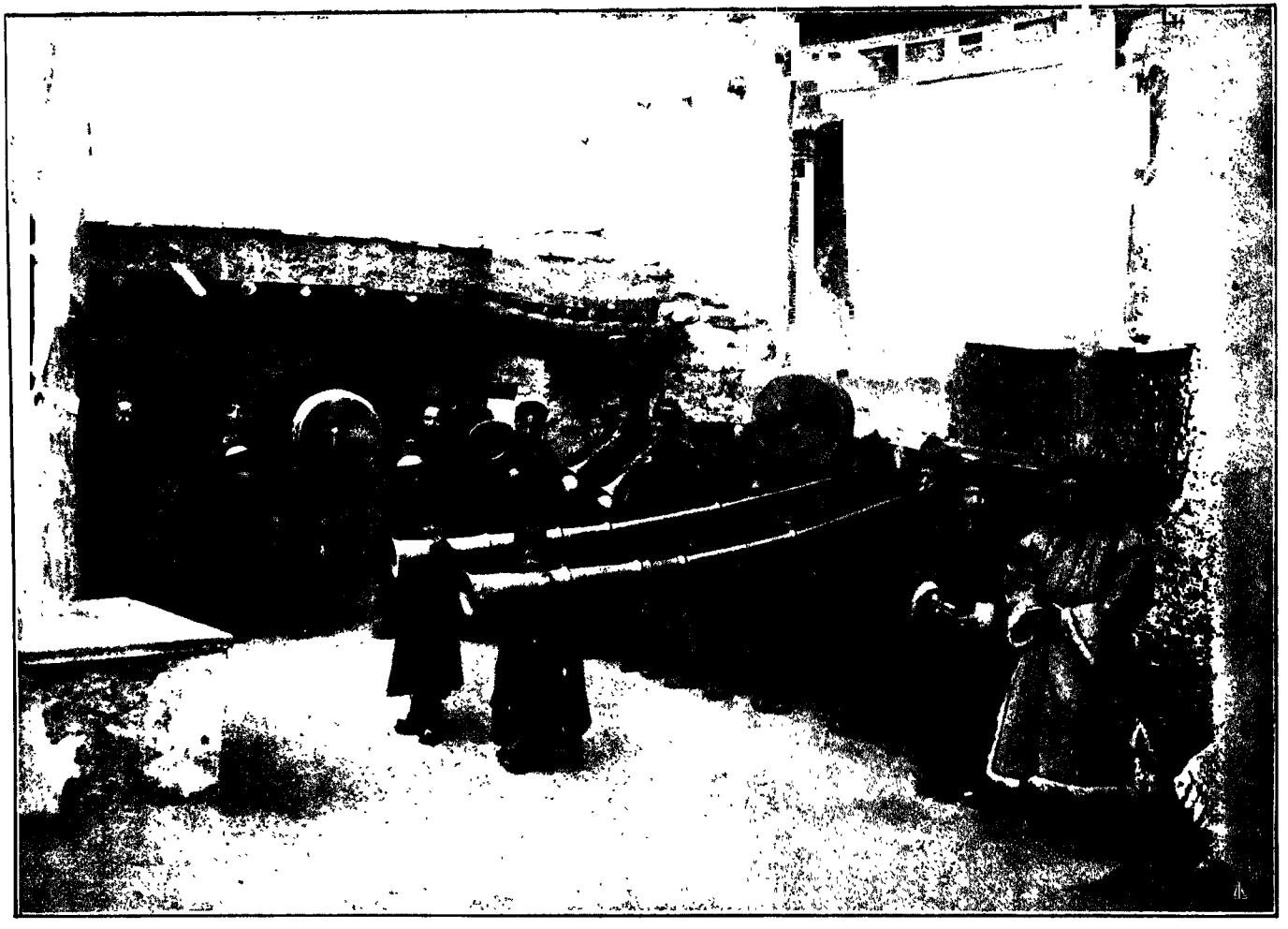
Very few of these things are made in Ladak. Most of them come from Tibet.

Mural paintings representing Tantric divinities, on the north wall of the lower chapel on Namgyal Tsemo, Leh. The central figure is in the ritual attitude called Yab Yum, embracing his Sakti.

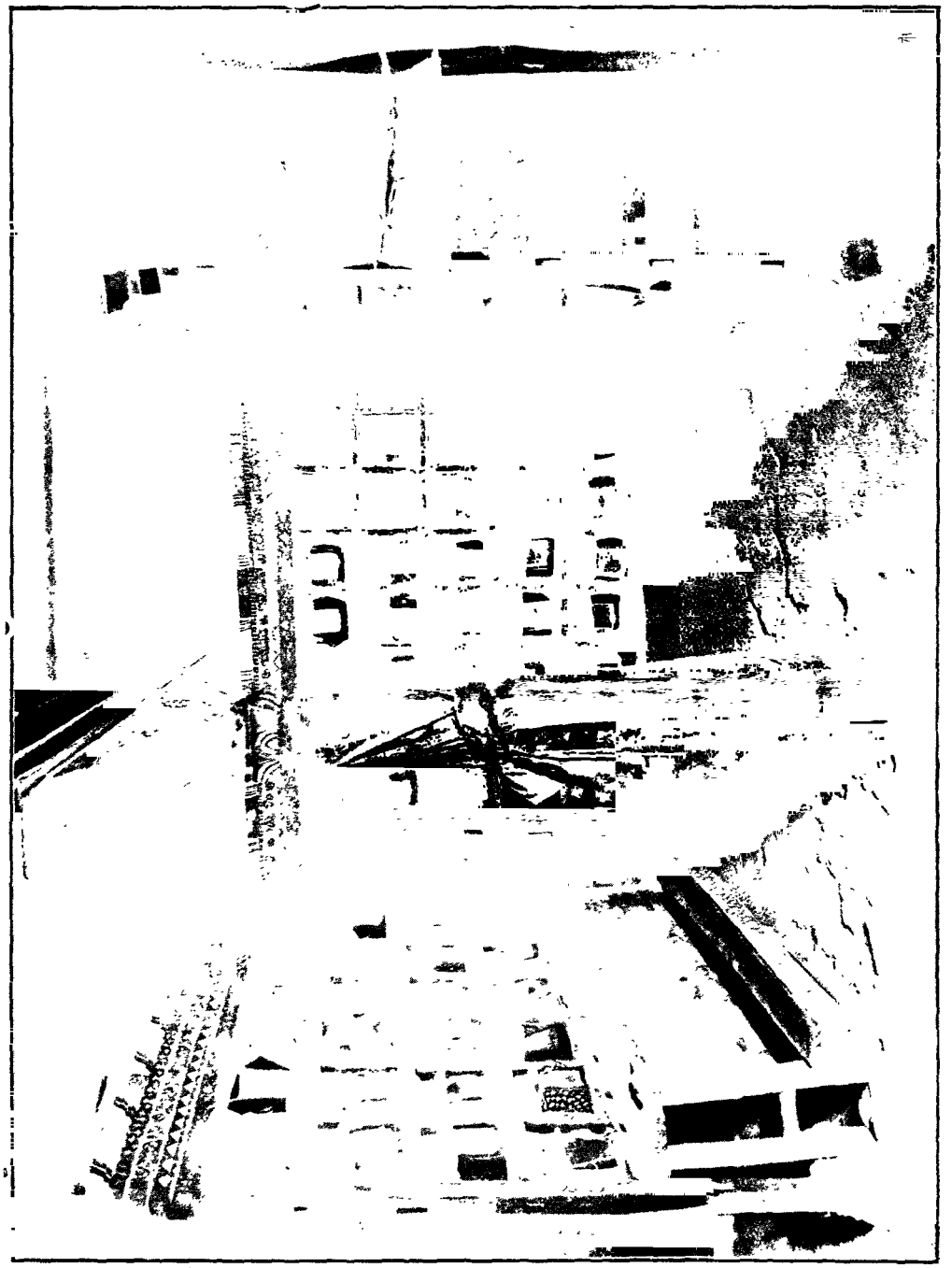


The Kushok's private chapel, in the monastery of Sankar, near Leh.

Tankas in the *Kushok's* apartment in the monastery of Himis, representing scenes in the life of Jetsum Mila Raspa.

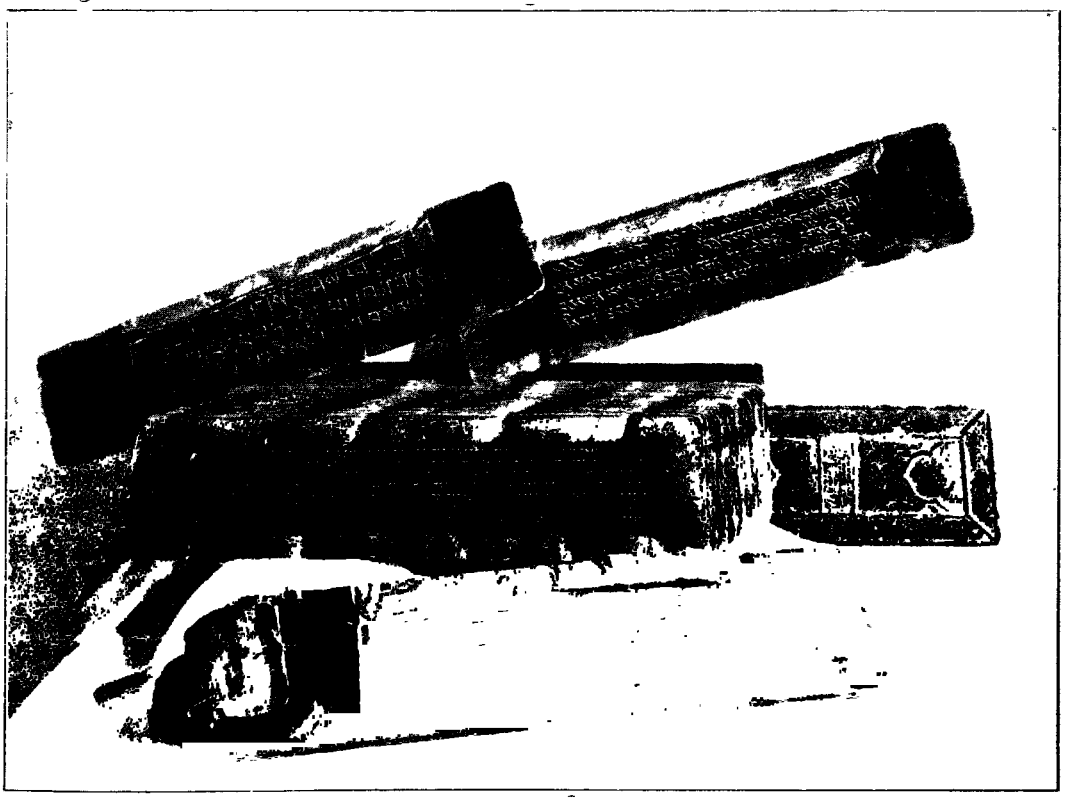


Musicians in the monastery of Likir.



The library, Tikse.

Probably the colossal statues of the Buddhas, sometimes 30 feet or more high and built on the spot, covered perhaps with modelled and gilded metal plates, and the mural paintings of the temples as well, were executed in the past by artists from Tibet or Nepal. Tibetan art is derived from three sources, Chinese, Nepalese and Kashmiri; but it has developed forms and types so peculiar to itself that after a



A sacred book.

short stay in the country one is able to recognize the genuine Tibetan product at a glance.

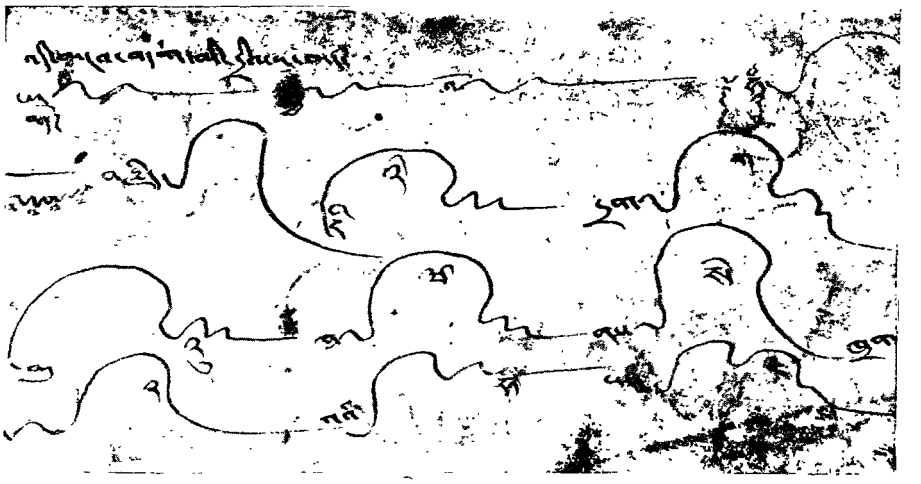
In the more important monasteries a room is set apart for the library. In Tibet and Ladak there are hardly any other books than the sacred ones. They comprise two works: the first, called the *Kahgyur*, contains the canons; the second, called *Tangyur*, the commentaries, the treatises on magic, an encyclopædia and some literary works. Together the two make up 300 volumes. Each volume is composed of a number of loose sheets of thick black paper, about 24 inches long by 8 wide, written

Lama reading a volume of the *Kahgyur*, in the monastery of Tikse.

or printed on one or both sides, in the great majority of cases with the Devanagiri characters imported into Tibet from India in the 8th or 9th century.[1]

The leaves are held together between two boards which are often decorated with carving, and every volume is wrapped in a piece of stuff. The printing is done from wooden blocks in Tibet proper, at Nartang near Shigatse, where a complete collection of blocks for printing all the sacred books is kept and the work permanently occupies 300 monks.[2]

The interior of the sacred buildings, indeed the whole atmosphere of the monastery, is pervaded by a nauseating odour of rancid butter and burning wicks from the votive lamps and also from the habit the monks have of throwing on the floor



Tibetan musical notation: fragment of a Book of Songs (Yang Jig).

the dregs of the buttered tea which is served them during the offices. With this mingles the body odour of the monks themselves, who are unspeakably dirty; the aromatic fumes of the little sticks of benzoin do not go far to neutralize the smell.

The religious offices have a ritual as rigid and complicated as that of the Greek or Roman Catholic Church, and are accompanied by music and chorals resembling the Gregorian chants. Tibetan sacred music is probably unique in the Orient in having its own notation, corresponding to the neumes which were in use in the chorals of the Roman Catholic Church until about the fourteenth century. As a rule, only

[1] On the subject of the various alphabets used in Ladak, see A. H. Francke, *Notes on a Language Map of West Tibet* (Jour. Asiat. Soc. Bengal, Vol. LXXIII, Part I, p. 362); and T. Bacot, *L'Écriture cursive tibétaine* (Jour. Asiatique, Jan.-Feb., 1912).

[2] See Ekai Kawaguchi, *Three Years in Thibet*; Madras, 1909, pp. 247–8.

the monks take part in the services. The laity are admitted to the temples only under special circumstances and for special feasts, when they make long journeys to reach the monastery where these are celebrated. The celebrations are so arranged that they take place successively in different temples, and the population may attend one after another in a given district. The well-to-do usually have a private chapel in their houses where services are held and monks summoned from the monasteries come to celebrate religious anniversaries.

The religious wear a habit resembling the traditional garb of the apostles. A long sleeveless woollen garment of a dark brick red falls from shoulders to feet and is fastened by a band wound round the body. Over this is worn a loose wide mantle which goes over the left shoulder and under the right arm-pit, leaving the right arm bare. The head is clean-shaven like the face, and either bare or covered with a characteristic cap with the wide brim turned up at the sides and back. This cap is red among the various red sects and yellow among the Gelugpa or reformed sect. From the girdle hangs a little leather case containing a vial of holy water, and the rosary. The right hand holds the prayer-wheel. The nuns (*chumos*) at first sight look just like the monks, and seem even dirtier.

The high dignitaries of the Church, abbots and *kushoks*, give more care to their persons and clothing, and not infrequently dress with real magnificence, in tunics of damask silk, with a variety of headgear, in fur or lacquered wood in the Chinese style. They display all the pomp and dignity befitting archbishops and cardinals. They are always accompanied by an escort of monks, and are greeted with every mark of reverence, the populace prostrating themselves, kissing the folds of their tunic, imploring a benediction—to an extent which made Desideri exclaim ingenuously: "Would to God that the Christian Catholics showed one hundredth part of such sentiments to the prelates, ecclesiastics and religious of our Holy Catholic Church!" [1]

It has long been known that an extraordinary resemblance exists between the Lamaic-Buddhist and the Roman Catholic cults—at least in the outward forms of the organization and the ritual. The ecclesiastical hierarchy which descends from an unquestioned spiritual and temporal central power, concentrated in the two Grand Lamas and their courts with the other high ecclesiastical and civil dignitaries which belong to them, to the high Lamas stationed in the dioceses and the superiors of the larger monasteries, and thence to the priors of the smaller monasteries, the feudatories of these; the whole ritual of the religious ceremonies in the temples, the vestments of the officiating monks, the vows, the celibacy of the clergy, the poverty and asceticism, the sacred books and canons, the fasting, the Rule and the discipline in the monasteries, the solemn processions, the collection of alms in the churches, the recitatives, the use of holy water, incense, rosaries, exorcism, benediction by laying on of hands, a form of confession and of baptism, the spiritual father for the guidance of

[1] De Filippi ed., p. 191.

the laity, the representations of winged angels, the nimbus round the heads of saints, paradise and hell, prayers for the dead, and works of charity for the relief of their souls —all these, not to speak of other less evident features which they have in common, form a picture which is certainly striking. It is not hard to understand that even before there was any direct knowledge of the mysterious Tibet, the legend spread of a country inhabited by Christians who had at some time unknown lost touch with the rest of the world but preserved some part of the Messianic cult and tradition.[1] It was this legend which inspired the Indian missions to send out missionaries who sought to penetrate to the mysterious region—those of Bento de Goes in 1603 and Antonio de Andrade in 1625. About a century later, the first missionaries reached Lhasa, led by Della Penna, and followed by Desideri; and their letters, particularly the long and faithful narrative of Desideri, promptly destroyed the legend and revealed the abyss between the fundamental teachings of Buddhism and Christianity, even allowing for such changes as have taken place in both.[2]

The enormous number of religious in Ladak in proportion to the lay population has no parallel in the ecclesiastical body of any other country. There are 108 villages in the *tehsil* of Ladak and more than 170 monasteries and temples. The census of 1911 gave for the state of Kashmir 36,512 Buddhists, of whom 3,015 were religious, including 9 *kushoks* and 278 nuns.[3]

The religious are recruited throughout the country and from all classes. The third son is usually dedicated from birth; but many join without obligation. It is clear that such a widespread predilection for the monastic life cannot be explained by a universal spiritual attitude or irresistible religious vocation. The religious career assures an existence comparatively free from want and not too rigorously ascetic; and it

[1] William Rubruquis called attention to these resemblances as far back as 1253, and Jerome Xavier wrote in 1598: "*Mihi quoque dum in Caximire agebam nunciatum est esse in regno Rebat* (Tibet) *multos christianos et ecclesias cum sacerdotibus et episcopiis*" (see in *Commentari della Cina* of P. Matteo Ricci, edited by F. Tacchi-Venturi, Macerata, 1911, p. 528; also Sir Henry Yule, *Cathay and the Way Thither*; London, 1916, Vol. IV, p. 167).

[2] See Vigne (*op. cit.*, Vol. II, pp. 251 *sqq.*), also Sven Hedin (*op. cit.*, Vol. III, pp. 313 *sqq.*), on the subject of analogies in the Buddhist and Christian cults and the hypothetical derivation of one from the other.

[3] Puini (*op. cit.*, note to p. 31) gives Ladak a population of 160,000 to 170,000 inhabitants of whom 12,000 are monks. These figures are probably taken from Moorcroft and refer to 1822, or from Csoma de Körös, 1820–30. Cunningham's figure in 1847 was 125,000, including the districts of Spiti and Lahul, directly under the Indian government. In the interval the population had been decimated by a smallpox epidemic; and Zorawar Singh's wars of conquest had caused the exodus of about 9,000 from Ladak into Tibet proper and the death of many thousand men. Besides, the number of monks varies greatly, with the return of students from Tibet and the influx of novices. The above figures do not take account of the demi-monks or tertiaries, who have only taken part of the vows and live in their own houses, often with wives; nor of some hundreds of demi-nuns, not married, but living outside the community.

confers a social status quite above that of the mass of the population, who are little better than serfs. But after all the chief reason for the large number of religious lies in the organization of the family in Tibet and Ladak, where fraternal polyandry is frequent, especially among the poorer classes—another of the oddities of this oddest of countries. Properly speaking, only the eldest of several brothers in a family takes a wife, the others become joint husbands.[1] The result is that the woman has considerable influence in family affairs—though the situation is hardly a true matriarchy—with a dignity, a social position and a freedom not surpassed in any country in the world.

The survival of this primitive system in such a complex and evolved social aggregation as the Tibetan has been explained on economic grounds : the necessity of keeping fixed the number of families in order not to subdivide the small amount of productive and irrigable soil.[2] It seems too simple an explanation, but at all events the supposed purpose is achieved. The population is strictly maintained at a figure not larger than the soil can sustain ; and the Ladakis enjoy a prosperity incomparably greater than that of the polygamous Mussulman Baltis.

These brief and summary notes on the characteristics and customs of the Ladaki people may, I hope, render more intelligible the narrative which follows, and the descriptions of the places we passed through on our journey. The need of escorting the large caravans of supplies prevented me from going off the direct route to visit many interesting and typical sights. I shall however avail myself of memories of an earlier visit, in 1909, to describe them—also of the notes of my companions, who were able to make several side excursions. The narrative of our experiences of the country and its people will be completed by the chapters by Dainelli which follow.

As I have said, the road from Kargil to Leh surmounts two minor ranges in order to return to the valley of the Indus. The first march is up the valley of the Wakkha, a tributary of the Suru ; a stream which, as usual in these valleys, runs in a gorge in its lower part and where it flows into the basin of Kargil. The road crosses one of the high alluvial terraces of the basin and enters the Wakkha valley by traversing the slope above the gorge.

When I set out, alone with my caravan, on the morning of February 25th, the

[1] I regret that I have not space here to go into a detailed description of the marriage ceremony and the formalities of the contract. There is a succinct account in Cunningham, *op. cit.*, p. 308. The procedure varies somewhat from that in Tibet as described with such richness of detail by Desideri (Book II, Ch. XVII ; De Filippi ed., p. 192) and confirmed by successive explorers. Giorgi gives an account in the *Alphabetum Thibetanum*, p. 458 ; also Della Penna, in a letter cited by C. R. Markham, in the appendix to the *Narrative of the Mission of George Bogle to Tibet*, etc., London, 1876, p. 336. See also the narrative of Sarat Chandra Das : *Journey to Lhasa and Central Tibet*, edited by Rockhill, London, 1902, 2nd edition, p. 247. Among recent accounts is Kawaguchi's *op. cit.*, pp. 352 *sqq.*

[2] There is a detailed discussion of this question in Puini, *Il Tibet*, pp. 137–49. See also Rockhill, *Land of the Lamas*, pp. 80, 144, 211 *sqq.*

thermometer stood at −3° F., but the radiant sunshine soon moderated the cold. The huge basin of Kargil in winter dress was a dazzling sight. In places on the slope where the snow had melted, the radiation was so intense that the bare earth steamed. At the mouth of the Wakkha valley lies the large oasis of Pashkyum, which has abundant irrigation and in summer is a perfect bower, at the base of a rock topped by the ruins of a fort. This fort was the theatre of a brilliant military action by the Dogras in the invasion of 1835.

Soon the valley opens wide. The path goes up the right bank, and opposite it, as though stuck on the face of a high perpendicular rock, are the white walls and red-framed windows of our first lamasery, Shargol, part of whose rooms are dug out from the rock itself. A settlement of a few houses lies in the valley below. Dainelli, Ginori and Antilli passed here a few days later and stopped to visit the monastery, which is a daughter house of the one called Mulbek, farther on, and has but one temple, with the usual furnishings.

The valley continues to mount gently. In summer, when not masked by the snow, it has a very strange appearance, due to the erosion of the alluvial banks, which are cut into symmetrical, almost architectural forms, like glacis, battlements and towers.

Our first stage ended at Mulbek, 21 miles from Kargil and at least 1,600 feet higher; a group of little houses clustered at the base of a rocky height, on which there are two monasteries, the older at the summit, the other a little lower, on the ridge. On another, higher, summit stand the ruins of another building, a monastery or fortress. These establishments, like Shargol, are fiefs of larger lamaseries farther on, and harbour hardly two or three monks each.

At Mulbek we encountered for the first time all together the principal monuments which I have described above; but on a much smaller scale than we should see later in the larger centres. There were a few *chortens* at the entrance to the village and on the ridge where the monastery stands. A few hundred yards beyond the town the path skirts a boulder with a flat face 25 or 30 feet high, on which is carved in low relief a figure of Chamba (Maitreia), the Buddha whose next incarnation is being awaited. Only half of the figure can be seen; the lower part is hidden by a little temple built against the rock, containing some mural paintings and a wooden statue of the many-armed and many-headed Chenrezi (Avalokita). The whole relief may have formed the inner wall of a temple of the same height; and the square holes cut in the upper part of the rock may have served for the ends of the beams of the roof. Or perhaps there was only a sloping roof to protect the work of art.[1]

Our road still mounted the Wakkha valley for a long stretch, with its strange bastions and glacis, its towers so round and straight and symmetrically arranged that it seemed impossible they could be the work of nature. Then the path turned off into a tributary valley on the right, leading up to the pass, the Namika-la, 13,000 feet above sea-level.

[1] See the note on p. 58, Chapter III.

The poor animals panted painfully upward, slipping on the ice that coated the beaten path. But if they set foot outside it they sank up to their bellies in snow. We met some packs of donkeys; and the caravans of animals seemed out of place in this landscape of high mountains and deep snow. In summer the tract is barrenness itself, striking even amid the general aridity of the whole region: the path runs between yellowed slopes that look as though a great fire had swept over them, consuming everything in its path.

Beyond the col we descended by a coomb like that which we had come up; farther down it widened out on meeting with other side-gorges, and became more level. There were a few clusters of houses, which seemed deserted, and under the snow we could make out low mud walls marking off the fields. After an hour and a half we came out into the basin of Karbu, which opens out between two straits of the valley and is comparable to the basin of Skardu, though appreciably smaller. A large *chorten* marked the confluence of the two valleys. The basin of Karbu is enclosed by mountain ranges of bold and imposing design. It almost seems as though there were a relation between the architectural fantasy of the people and these forms in nature due to the sculptured rocks and the erosion of the alluvial terraces. The spurs on the left side bristle with rocky natural *chortens* sticking up out of the snow; in places they are cut into regular battlements. Down in the valley is an isolated rock ridge covered with ruined buildings and walls, its summit crowned by high, thick broken walls. Farther down is a white monastery, and nestled at its feet the village of Karbu. A little farther on, still on the left side of the valley, a great cleft opens between two high vertical rocks like gigantic door-jambs, revealing a system of valleys with intersecting ridges. Above one of the vertical rocks, on the summit of a formidable precipice, lie the extensive ruins of what must once have been an immense monastery or fortress; there seemed no way to get up to it. At the foot of the precipice are a host of *chortens* of every size, and quantities of dilapidated *mani* walls, in front of ruined houses and tombs that are broken open and the bones scattered about. These are evidently the relics of an ancient abandoned village, dead like the castle that once held sway over it.[1]

Not far away is the bungalow of Bot Karbu, on the left side of the wide plain, in the middle of which, at regular intervals, four monumental *chortens* rise, two of them still intact, surmounted by the little pinnacle and symbol.

Six or seven miles below Bot Karbu lies the fine castle of Chiktan, on a spur that runs out to the centre of the valley. It will be described by Dainelli, who visited it on his way up to Kargil from the Indus valley on the day on which I reached Bot Karbu. Antilli, Abetti and Ginori also went to see it later.

From Bot Karbu you rejoin the Indus across another pass, the Fotu-la, 14,625 feet high. I set off early on the 27th of February; the day was so calm and sunny

[1] According to Francke (*Antiquities*, etc., p. 98), they are the ruins of the old city of Karbu, abandoned by the fortunes of war between 1620 and 1630. The tombs are Dard and Mohammedan.

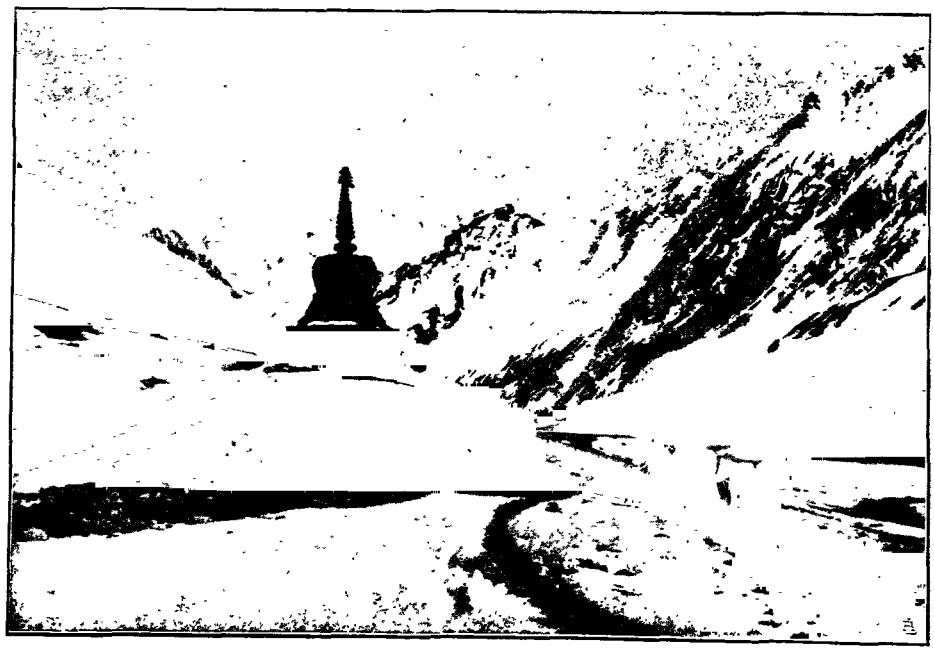
as to belie the thermometer which stood at 5° F. The pass is reached by a tributary valley to the right of Karbu, at first open, then narrowing to a gorge, among magnificent needles, spires and pinnacles of rock. We tacked up the right side to the summit, surmounted the crest, and then skirted the adjoining little valley, reaching the pass in a short time. At the top is a big half-ruined *chorten*. Here too the scene is completely transformed by the snow—in summer the same spot is like a landscape in the moon, so bare is it, so desolate and void of life.

From the col we descended eastwards into a wide valley, which narrowed as we went down. We saw more and more *mani* walls. The path runs at the base of a high

Chortens and *mani* wall on the way to the Fotu-la.

terrace of conglomerates cut vertically towards the valley, with its side carved in columns like organ pipes The view down the valley was shut off by a spur that ran in from the left, with a large *chorten* at the end of it. We rounded the corner and saw before us a scene that beggared the imagination. The path went on before us, bordered by long rows of *chortens*, from 6 to 16 feet high, sometimes in a double row, alternating with *mani* walls. A few hundred yards farther on, against a splendid background of snow-covered mountains there extends across this side of the valley a buttress like a wing in a stage setting, formed by a huge colonnade of pillars of clay and conglomerate, from 150 to 200 feet high, divided by deep and narrow fissures ; and at the top of these is the great monastery of Lamayuru, 13,440 feet above sea-level, an extraordinary aggregation of buildings,

with rough plaster or whitewashed walls, crossed by large red stripes. Several *chortens* were visible, some of them very large. The buildings are squeezed into the narrow space; they even overhang the wall, supported by beams that rest on the tops of the pillars. Grottos are hollowed out in the narrow furrows between the columns and you can see the walls and windows of houses constructed half-way up and resting on beams wedged in between column and column. The whole of Lamayuru bears witness to the dryness of the climate; for a few wet seasons would reduce foundations and all to a mass of mud and stones. The houses of the village are ranged on a terraced slope at the foot of the wall, amid crowds of *chortens* of every size, with chapels and



A turn in the valley above Lamayuru.

shrines and huge prayer-wheels, giving to the whole village the look of a cemetery. A passing procession of red monks in a long file against the snow put the finishing touch to the scene.

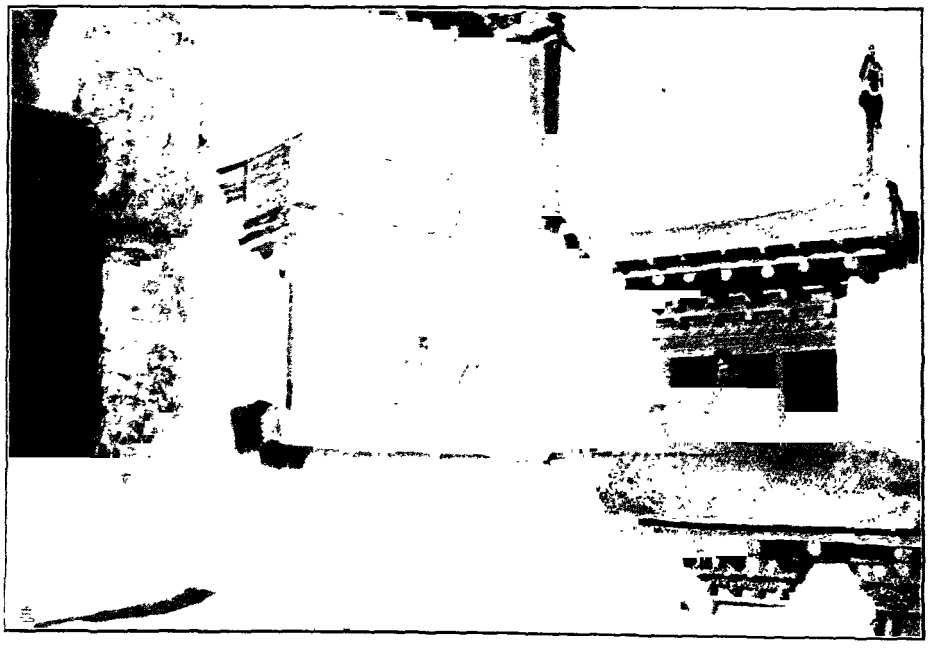
The monastery consists, as usual, of the monks' houses, with several larger buildings, great dark frescoed rooms containing the statues of Buddhas and Bodhisatva and the legendary founder of the monastery, a Lama from Brebung, near Lhasa [1]; the *tankas*,

[1] See Cunningham, *op. cit.*, pp. 321 and 359. The ancient name of Lamayuru was Yung-drung, the monastery of the mystic cross or swastika. Francke (*History of Western Tibet*, p. 52) mentions the tradition that this was a monastery of the Bon cult before the introduction of Buddhism, which would make it the oldest monastery in Ladak.

Lamayuru.

or painted banners, vases for lamps and votive offerings, besides a collection of sacred books. All the equipment is modern and without artistic value; the valuables were probably destroyed or plundered by Dogra soldiers in the wars of the last century. There is a fair-sized square where the great religious feasts are celebrated; into which run the little alleys which form passages between the houses of the monks.

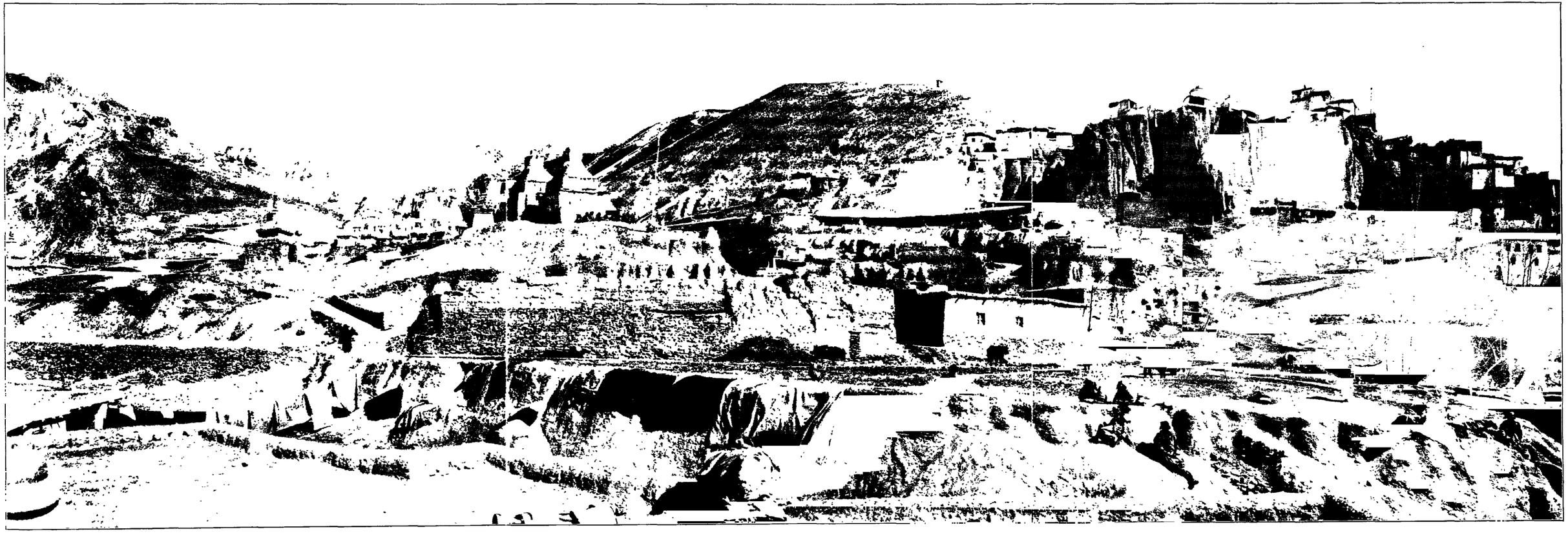
The abbot of Lamayuru has jurisdiction over a large number of lesser lamaseries. There are two or three hundred monks, and some nuns or *chumos*; but only some forty are at the monastery in summer; the rest work in the fields.



A balcony in the monastery of Lamayuru.

My companions visited Lamayuru a week after me. Alessio and Abetti stayed there for 11 days, up to March 19th, and made a gravimetric and magnetic station, with the accompanying astronomical, meteorological and topographical observations. The aerial for the wireless was stretched between the *gonpa*, at the top of the wall of conglomerates, and the little square in front of the bungalow. Dainelli, Ginori and Antilli only remained one day, leaving on March 9th to visit several villages and lamaseries in the Indus valley and make various excursions outside the caravan route.

As for me, I took the direct route to Leh on February 28th. Directly one rounds the spur on which the *gonpa* is built one sees that the main village and its cultivated fields lie behind it, at the base of its eastern wall. Farther down one crosses an enor-



LAMAYURU

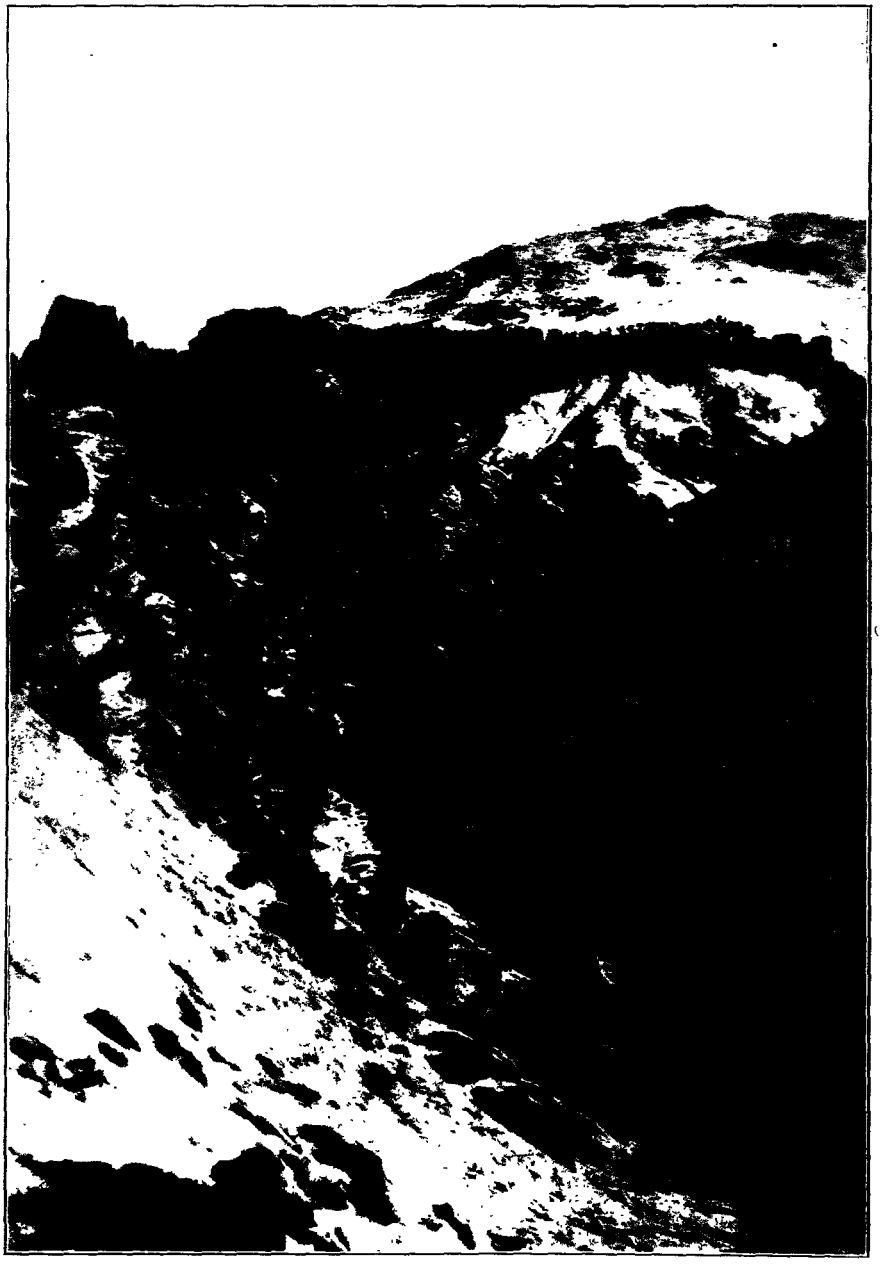
mous bed of clay which covers the whole valley with thick layers for a good stretch, and looks like a molten mass of clear straw-colour against the black rock. A steep zigzag path takes you down into deep gorges, among jagged rocks all striated in vertical stratifications of yellow, brown, green and purple. You reach a sunless abyss, so narrow that there is barely room for the little stream, now ice-coated. The high rock walls resound with echoes of the cries and whistles of the caravan men. Several tributary gorges cut in the rock walls flow into the principal one. You finally issue from the gully into an open stretch which soon debouches into the valley of the Indus; the path follows the left side as far as the bridge of Kalatse. It is a fine bridge, suspended by iron cables across a narrow stretch of the Indus, which was frozen from shore to shore for a good distance at this point. On the left bank the bridge rests on a solid masonry bridge-head, on the other side on a rock leading up to an opening in the wall of a fort, through which one is thus obliged to pass. Directly above the spot where the present bridge rests there is another opening in the wall, whence still project some beams which must be the remains of an older cantilever bridge. In former times there was a customs house here, and a guard on the bridge, when Ladak was divided into little principalities and Kalatse was an autonomous Dard colony.[1] Now the bridge is guarded by a single *chokidar*, who escorted us through the fort. As far as Kalatse the route is bordered by a succession of *mani* walls and by rows of *chortens*; and pictures of *chortens*, ibex and horsemen armed with bows and arrows are incised on the rocks along the way—these date from the Dard period, before the 11th century.[2]

Kalatse is a thriving little place, with extensive cultivated fields, gardens and orchards, and many well-built houses. There is a post and telegraph office, also a Moravian mission, a branch of the one at Leh. There are groups of *chortens*, a little Lamaic temple and a good bungalow. But among the new houses in the village there are also many abandoned and in ruins. Neither in Ladak nor in Baltistan is any repairing ever done, either of religious structures or of dwelling-houses. When a house is ripe for decay they build another one beside it. The tumbledown *chortens* and *mani* walls with votive stones fallen off on either side, which no one thinks to replace, give impression of a decaying past. But actually shrines and *chortens* and *mani* walls are built to-day and votive stones inscribed; though the accumulations of centuries are naturally more striking than the modern tributes.

Kalatse, like the villages we were to see farther along this bank of the Indus, is built at the edge of a wide, deep ravine cut out in the alluvial terrace by a tributary of

[1] The present fort was built by the Dogra after the conquest (Bellew, *op. cit.*, p. 122); but see Francke (*History of Western Tibet*, pp. 49 and 65) on the history of Kalatse and its forts and bridges; also *The Dards at Kalatse*, by the same author, in Mem. Asiat. Soc. Bengal, Vol. 1, 1905–7, N. 19, and *Antiquities*, p. 194.

[2] Francke, *History of Western Tibet*, pp. 32–3.



Entrance to the gorges below Lamayuru.

The bridge at Kalatse.

the Indus. Tradition says that there was here a colony of Dards from Gilgit.[1] They lived in a fortified place now reduced to formless ruins situated something over a mile above the present Tibetan village. When the Dards left a place they used to carry away all the wood—beams, doors and frames, leaving the house in ruins. Near the castle still exist recognizable traces of fields and remains of *chortens* and tombs. The present village, and the castle on the rock above were built by the Ladaki king Naglug, about 1150.

This part of the Indus valley looks quite different from the deep and narrow hollow below the junction of the Suru-Dras. Here the valley is open, with a broad level floor. The range on the south is fairly steep, with short spurs, and snow-clad. The one on the north, the Ladak range, which separates the Indus valley from the Shayok, is a long distance from the river, and just shows through some openings of the valleys enclosed by the long spurs which end at the Indus in uniform slopes covered with minute variegated detritus. It looks as though this part of the valley had not yet been dug out by the river, as it has been farther down ; the alluvial terrace on which the path runs, some 40 to 50 feet above the river-bed, would represent those remains of deposits which we saw below the Suru-Dras, clinging to the sides hundreds of feet above the valley bottom, and which are quite lacking here.

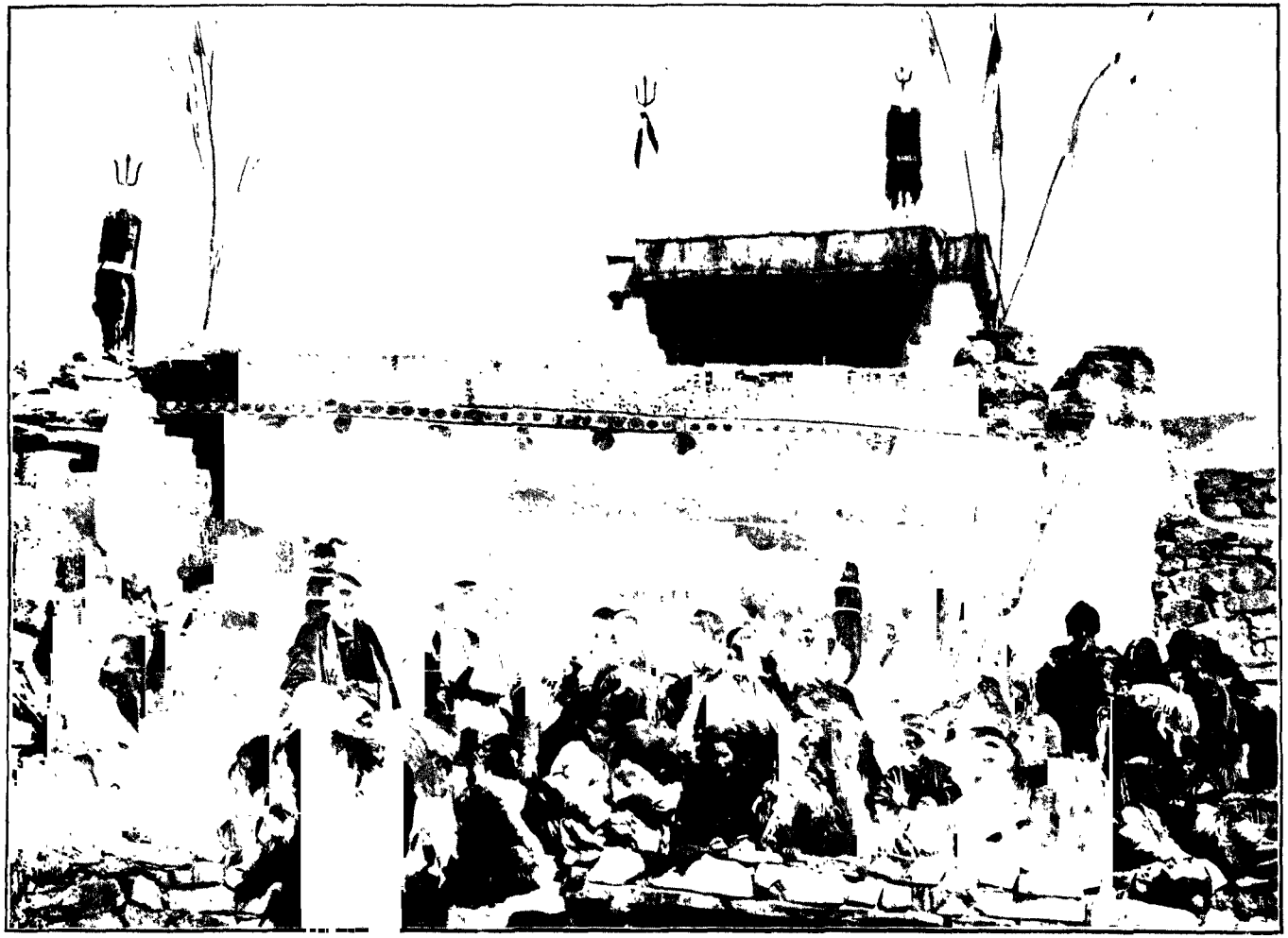
The first village of importance after Kalatse is Nurla (Snurla), also on the bank of a tributary to the Indus. The road to Leh once went up this valley and then crossed the spurs enclosing several tributaries at a distance from the Indus, to which it came back at Spituk (Pittuk) only a little way from Leh. Later a road was made along the Indus, the rock being blasted away ; it is shorter, but cuts off several of the most interesting lamaseries. Dainelli, Antilli and Ginori varied their route and were able to visit many remarkable places.

In the little Nurla valley, a few miles from the Indus, there is a spur set astride a bifurcation of the valley ; the summit of which, at the top of a precipitous wall, is entirely enclosed by an imposing curtain of fortifications, double at intervals, and punctuated by big towers, with other isolated towers along the ridge. Inside this fortress are the temples and monastic houses of the monastery of Temesgam, together with a gigantic *chorten.* There are two temples, with rich collections of *tankas* and statuary ; and a colossal seated Chamba, which takes up three storeys of the building and looks like a Russian ikon, with its diadem painted in high colour and set with precious stones, and covered with rich materials and ornaments and symbols of every conceivable sort.

My companions had the good luck to arrive on a feast day, the 15th day of the first month of the Buddhist year (March 11th), and to be present at a religious celebration in one of the temples, attended by a large crowd, with many women and children, who performed the ritual circuits of the temple, singing, turning prayer-wheels and telling rosaries.

[1] A. H. Francke, *The Dards at Kalatse*, p. 43.

Colossal statue of Chamba (Maitreia) in the monastery of Temesgam.



Crowd of worshippers at the temple of Temesgam.

From Temesgam the party crossed a spur on the east and went down into the small adjacent valley, where they visited the monastery of Himis Shukpa,[1] and went on to Rigzon, one of the few monasteries of the yellow sect in Ladak, built at the mouth of a narrow secondary gorge. This monastery, whose head is a venerable abbot of eighty, is subject to the monastery of Samtan in the Nubra valley, the residence of two *kushoks* or incarnations. There is no village near by; nothing but the monastery and monks'

The Monastery of Rigzon.

houses built like an amphitheatre on the slope, all white, with terraces, galleries and balconies, and displaying the usual red stripes. You climb from one building to another by a series of rough steps, of unequal height, cut in the rock, with a few ladder-like stairs in the steepest parts. The large temple is richly adorned with a row of garmented divinities, the walls are frescoed save on the right side, which is filled by the pigeon-holes

[1] Not to be confused with the monastery of Himis, on the left bank of the Indus above Leh—a much more important place. Shuka or Shukpa means juniper, and there are, in fact, several juniper-trees (*juniperus excelsa*) near the monastery.

for the library, also by two thrones for the *kushoks* and a lower seat for the abbot. There is also a minor chapel and a private oratory for the abbot. When I visited Rigzon in 1909 there was shown to me as an object of great rarity a Wheel of Life, in relief, with its many images and symbols and figurines all modelled and coloured.[1] It took up a space more than 4 yards across in a special little room high up in the monastery.

The Abbot and Monks of Rigzon (yellow sect).

On the crest of the mountain above the convent, under a rough shed is a row of prayer-wheels with little rays ending in spoons to catch the wind and set them in motion. Near by is a little square building with a grated window, full of prayers printed on strips of paper and birch-bark.

From Rigzon the rest of the party went down to Saspul; I reached it directly from Nurla, along the bank of the Indus. It was a picturesque stage. The valley is strewn with rocky protuberances, hummocks, crests and sharp spines, alternating with

[1] See next chapter, pp. 184–187.

stretches of alluvial banks. The Indus here runs in a narrow tortuous bed, which it has carved in the living rock; it was completely frozen for nearly a mile. On the left side of the valley there is the same steep wall, dropping down sheer to the river. You round the ends of two spurs with one of the usual ravines between them, and all at once there opens before you a vast stretch of valley with low lines of hills running into it from every direction and interlacing, though without cutting off the view of the mountain ranges. Saspul lies in a recess of the plain. A little over a mile from it a small cantilever bridge without sides spans the Indus at a point where the river is narrowed in to about 120 feet between two rocks. When I crossed it in 1909 the bridge had already sagged and fallen into decay; it was now in such a state that I should not have cared to pass over it even on foot.[1] It leads to the ancient monastery of Alchi, on the left bank of the Indus. Luckily the bridge was rebuilt in the next few days, so that the rest of the party was able to visit this lamasery too and get some pictures of it.

Prayer-wheels operated by the wind.

Beyond the bridge there runs along the path a long row of 108 little *chortens* on a common base.[2] Two miles farther on the road cuts off a sharp curve of the Indus and arrives at Alchi, bristling with *chortens*, some of them standing astride the path, with a square chamber covered with paintings in the centre of the portico. The monastery lies beyond the village, near a little grove. According to an old Tibetan legend, it is one of a series built by the early monks from Kashmir, who imported Buddhism into Ladak.[3] And, in fact, Alchi looks very different from the lamaseries of the Tibetan type. In the first place it is built on level ground, with the one-room houses of the monks standing one next the other in an irregular row, and large *chortens* scattered

[1] Who knows if this is not the very bridge that was built on this spot by King Sengge Namgyal, who reigned between 1590 and 1620 (Francke, *History of Western Tibet*, p. 100)?

[2] These processions of *chortens* are now rare in Ladak. Francke (*ibid.*, p. 97) thinks that many of them were turned into *mani* walls of a certain kind, in two storeys, with two sloping roofs one above the other, the narrower one on top.

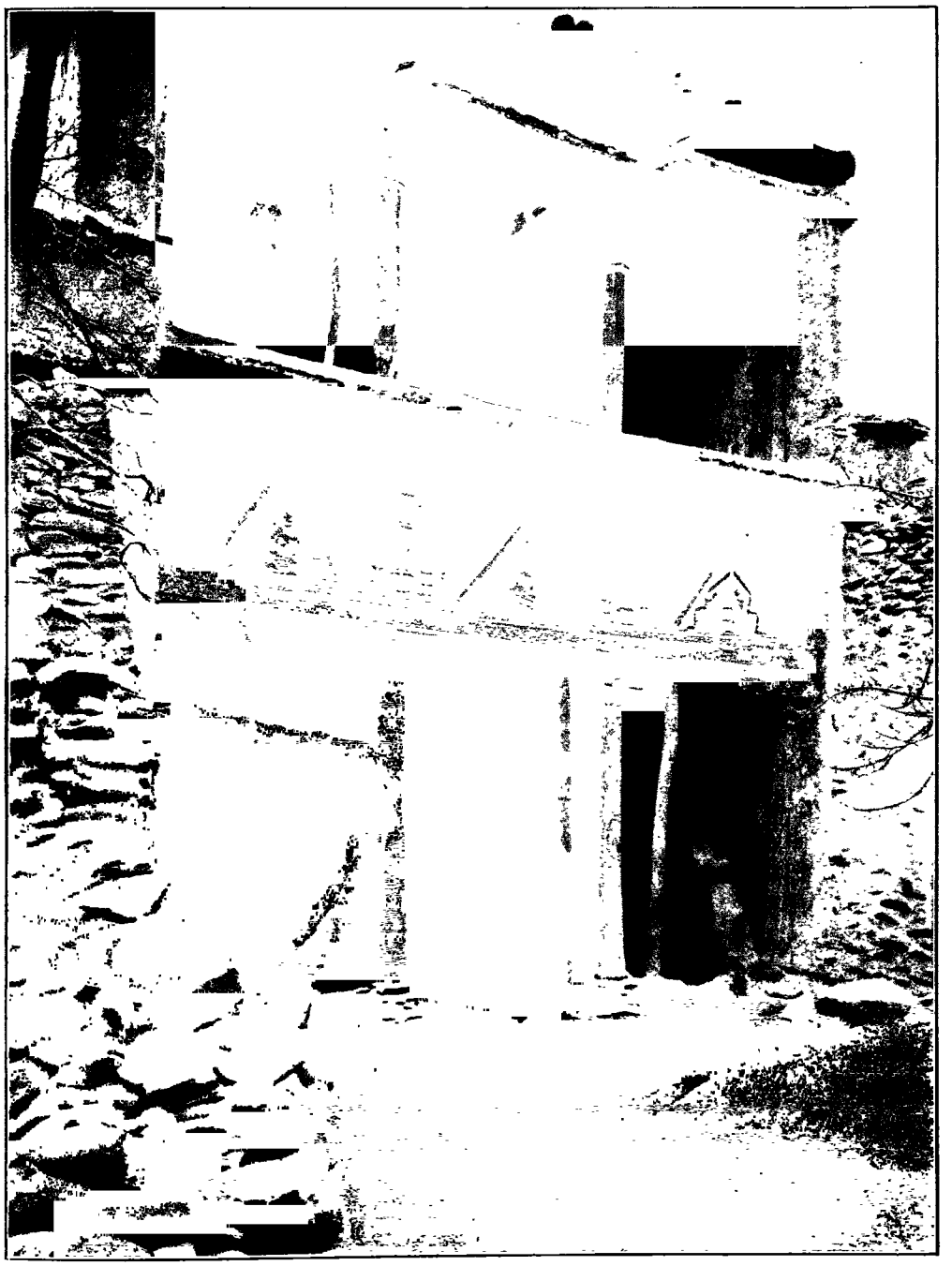
[3] Francke, *ibid.*, p. 51.

in front of them. The *chortens* have prayer-wheels fixed in the sides, and little vaults containing the usual written formulas or tiny reproductions of *chortens* modelled in clay or stamped on medallions. But still more striking is the architecture of the chief temple. The façade has an open front consisting of beams supported on wooden pillars, so that there is a little portico on the ground floor and a covered loggia on the upper storey, while between the two runs a small gallery divided into curious little trilobate

Alchi.

arches. The door-frame, architraves, and capitals are painted a lively red and richly ornamented with carving and mythological sculpture. The general effect is clearly reminiscent of a classic style and in particular of the Graeco-Buddhist or Gandhara art, which could not have been introduced here save by way of Kashmir. You reach the upper gallery by mounting a tree-trunk in which deep notches have been cut to form steps.[1]

[1] This kind of primitive stairway is frequent in Asia. Rockhill describes it in the two-storeyed houses in eastern Tibet, and S. Turner found it in the houses of Bhutan (*An Account of an Embassy to the Court of the Teshoo Lama in Tibet*; London, 1800, p. 50).



The principal temple of Alchi.

The inside of the temple is entirely covered with mural paintings: there are little medallions which repeat *ad infinitum* the same small figure of a Buddha or Bodhisatva round a central square containing a larger figure surrounded by figures and animals reminiscent of certain Pompeian frescoes. But what strikes one at once on entering are three enormous niches in the centre of the back and side walls, occupied by rude colossal statues with double forearms and hands. These are surrounded by statuettes, winged genii and other symbols. The statues reach nearly to the ceiling but are cut in two by a gallery which runs round the temple at the height of the outer loggia which I have described, so that standing in the temple you cannot see their heads.

Another temple contains ritual objects, musical instruments, painted standards, sacred books and a row of divinities along the back wall. There are other, less important temples, but they are bare of ornament and uninteresting.[1]

I reached Saspul at noon on March 1st, after passing through the usual suburb of religious edifices, *chortens* and chapels with large prayer-wheels in a better state of preservation than usual. And I found an elaborate reception prepared for me: there were a hundred or so people, counting the inhabitants, the coolies to be dismissed and those to be taken on; a band of musicians, and a row of women in gala dress, ranged along the entrance to the village. As I passed the latter they all bowed together, very profoundly, and then rising clashed the bracelets which they wore on both wrists. The Ladak salute is a repeated syllable which sounds like "*Ju, ju!*"

The Ladakis, men, women and children, dress in warm, heavy cloth, and wear such a wealth of ornament that it is clear they are relatively well-to-do, by comparison with the rags and misery that sadden life in Baltistan. The men wear long garments of coarse wool that hang from shoulder to heel and give them a monkish look. Some of these are lined with sheepskin, or there are two garments, the inner one red, the outer originally white, with a long greasy stripe down the back from the pigtail that hangs to the waist. The clothing opens down the front, with a wide lap, and is held in place by a large woollen band, usually blue, wound several times round the body. There are no buttons or button-holes. The tunic has wide sleeves that fall several inches beyond the hand; it is slit at the sides from the knee down, revealing knee-breeches of white wool and felt leggings wound with a red and black band, ending in the beautiful Ladaki boot or *pabbu*, with the end turned up Chinese-fashion. The uppers are woven from black and white yak hair, the legging is of soft wool in coloured stripes. On their heads they wear either a skull-cap with a fur edge, or else the characteristic Ladaki cloth hat with a wide brim, turned up at the back and sides and faced with fur. All or nearly all the men wear at least one earring, a turquoise pendant or a silver hoop 2 inches across, strung with smaller hoops and in the centre a red cornelian or a turquoise; and they have necklaces of multi-coloured stones, turquoises, coral and cornelians. Even the

[1] For a detailed description of Alchi and its temples, with a learned commentary and explanation, see Francke, *Antiquities of Western Tibet*, pp. 89–92.

poorest wear round their necks if not a necklace at least one or two flat rectangular little copper boxes (*kahu*), inlaid with brass or silver, holding a piece of cloth or paper with the sacred motto, or a little idol wrapped in a rage or a relic. From the girdle hang little chains with a variety of tools: the bag for flint and steel, the knife, the long S-shaped pin to undo knots in rope, the keys of complicated padlocks; those who can write also carry the long iron case with a pen made of a bamboo splinter. A seal hangs from the case,

Ladaki women in gala attire.

and a little bag for the ink-pot and sealing-wax. A flat metal spoon and a wooden cup are thrust into the bosom above the girdle. Both men and women sew, spin and knit.[1]

Feminine attire is most complicated. The women wear a great mantle lined with sheepskin, edged with the fine long curling white wool of the Tibetan goat. The outside is of crimson cloth with a wide green border. The mantle is fastened on the right

[1] Schlagintweit (*op. cit.*, Vol. III, p. 925) remarks that the art of knitting with wooden needles came from China, and is perhaps older in Tibet than in Europe, where it was almost unheard of up to the 15th century. In India knitting is still entirely unknown.

shoulder by a large brooch with silver pendants, and it hangs to the feet. Beneath is a bodice closed to the throat, with long sleeves narrow at the wrist; the ample petticoat is of dark blue or red and blue cloth. Strangest and most picturesque of all is the head-dress. The top of the head is covered by the *perak*, a wide band of red felt that has a point on the forehead and tapers to the waist in the back. It is covered with a sort of mosaic of turquoises [1] mixed with cornelians, amber and coral and little gold or silver boxes containing amulets. The ears and sides of the head are covered by two fan-shaped flaps lined with black fur; beneath which pass many tiny braids that join farther down and are pieced out with black ribbon to form a great tuft which nearly sweeps the ground. On the exposed left shoulder is pinned a pendant composed of many tiny silver chains to which are fastened small toilet articles: nail- and ear-cleaners, tooth-picks, etc. At the back, to the right of the *perak* often hangs a cluster of strings of coral beads. On the wrists are bracelets of solid silver or—more rare and precious—the great conch shell cut out to make a single circlet. And to add to all this there are the very beautiful necklaces of beaten or filigree silver, the earrings, the finger-rings, the needle-case, the spoon, the mirror of polished brass—a multitude of trifles, too many to mention. Of course, what I have described is the gala costume. Most of the women one sees working in the fields or bent under the weight of their loads wear pretty filthy clothing; their backs are covered with a goat- or sheep-skin reaching not much farther than the waist.

Some of these women have regular features and might be good-looking if it were not for the layer of dirt that hides their natural complexion. One of their habits is to smear the face with the pulp and seeds of the ripe belladonna berry, leaving it yellow with light spots—a practice peculiar to Ladak. The Tibetan women use an ointment made of butter and soot—which is even worse.

A little above Saspul another valley comes into the Indus, the site of several lesser monasteries and an important one called Likir, which stands on a height in the centre of the valley. It is the oldest Ladaki lamasery, after those of the Alchi type founded by Kashmir missionaries, and it was built by a king of the central Tibetan dynasty about 1100.[2] The present buildings, of course, are a later reconstruction. My companions visited this monastery on March 13th and found there 15 monks of the yellow sect, presided over by a *kushok*. Besides the temple and the usual furnishings of the cult, there is a complete armoury—of course not of fire-arms. A collection of weapons is

[1] The turquoise is the commonest ornamental stone in Asia. Rockhill (*Land of the Lamas*, p. 24) says that the centre of the turquoise trade for Mongolia and Tibet is Hsi-an (the Hsi-ngan of the maps), the capital of the Chinese province of Shen-si. The stones come from Ho-nan, where they are mined, in rounded chunks or perforated disks, sold by weight. In Koko-nor (north-east Tibet), Tibet proper and Mongolia they are used as currency by travellers. The round beads are the most highly prized by the Tibetans. The Mongolians prefer those that have turned greenish.

[2] Francke, *History of Western Tibet*, p. 64.

kept in many of the principal lamaseries in Tibet; where monks of a certain class are supposed to fight in case of war.

Where the path to Likir turns off, the high-road to Leh also leaves the bank of the Indus and crosses a sort of high terrace, or rather a longitudinal valley, filled with sand and pebbles; it runs between a line of low hills which separate it from the Indus and the foot of the spurs which come down from the Ladak range. From time to time

The Monastery of Likir.

the terrace is cut by deep channels dug by the tributaries that come into the Indus on this side; they flow down from populous valleys up above, where there are many villages and monasteries. The path is carried across the empty plain, at this season almost covered with snow, at a certain distance from the Indus, up to the point where the Leh valley comes in; there it again skirts the river for a short distance.

The largest of these tributaries has a row of little villages on both its banks. One of them, called Bazgo, lies at the foot of a bastion of red rocks, crowned by the imposing ruins of some ancient fortifications, which are as important for the history of Ladak as the fort of Temesgam. Towards the end of the 16th century a monastery was built on the ruins of these fortifications; it contains one of the many colossal statues of Maitreia.

After crossing the Bazgo valley the path covers another level stretch, skirting several enormous *mani* walls, 25 to 35 feet thick, with large *chortens* at the ends, on bases at least 25 feet square. In the centre of the plain is a rectangular structure, with high walls made of great bricks of dried clay, without windows or other opening. One is told that it is an old cloister, but it looks more like a prison than a hermitage.

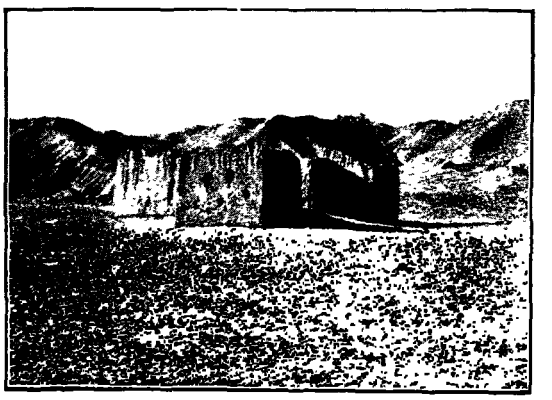
In the midst of the snow-covered plain, with the cold air stinging our faces, we saw a sign of spring—flocks of thousands and thousands of grey birds, the size of chaffinches, evidently on the return migration. And when we had left the Bazgo and were in the valley of another tributary stream, the Nimu, we heard partridges calling all about.

Bazgo.

After Nimu we covered the last portion of the plateau; getting farther away from the Indus, which at this point receives an important tributary, the Zanskar, from the opposite or southern side. It comes down from a district of the same name, afterwards visited by Dainelli and Marinelli, as will be related by the former. The Zanskar rises on the northern slope of the Himalayas and is nearly 200 miles long, with a volume perhaps as great as that of the Suru-Dras.

At the edge of this stretch of plateau there opens between the mountains on the north a wide valley, in which is a large monastery, Phayang. Here Dainelli, Antilli and Ginori spent three days as guests, to witness a complicated programme of dances performed by masked monks and quite inaccurately called devils' dances. The

spectacle lasts for two days, from morning till night, with brief intervals for the refreshment of the actors, and is attended by great crowds from distant villages and many monks from the lamaseries round about. This is not the place for a detailed description of the performance; it is a series of pantomime dances with musical accompaniment, by groups of corybantic monks in a variety of costumes of rich Chinese silks heavy with embroidery. They wear papier-mâché masks of a grotesque or terrifying kind, representing the muzzles of animals, and every sort of symbolic decoration, in which the macabre predominates, skulls and cross-bones and the like. The spectacle does not lack its comic side, thanks to the clowns, who are precisely like the traditional figures in our own circuses.



Ruins between Bazgo and Nimu.

All those who have spent any time in Ladak and been present at one of these performances have described them for us, but the descriptions differ in many details.[1] However, the dances take place at least twice in the year and possibly vary with the season; also they may differ in different monasteries. As for their origin and their religious symbolism, we have up to now no interpretation based on the Lamaic canons. The monks either do not know or do not want to explain their significance; the explanations they give are quite inconsequential and appear to be made up on the spur of the moment to satisfy the curious. Perhaps it is due to our lack of any detailed and precise description that we have as yet no exhaustive study of this interesting ritual, such as might lead to a fruitful parallel with the dramatic and choreographic art connected with the religious rites and mysteries of the ancients.[2] But this is hardly the place to dwell upon such a subject.

[1] See, for instance, Roero di Cortanze, *op. cit.*, Vol. II, pp. 26, 29, 38; Sir Martin Conway, *op. cit.*, p. 645; H. von Schlagintweit, *op. cit.*, Vol. III, p. 301; and E. F. Knight, *Where Three Empires Meet*; London, 1905, p. 206. The most exact and detailed description of the sacred performance and its various versions is given by Waddell, *op. cit.*, p. 515. The latest account, with abundance of detail, of the mystery play at the monastery of Himis is from A. Reeve Heber and K. Heber, *Himalayan Tibet*; London, 1926, Chapters XXIII and XXV.

[2] As for instance the rites of Dionysus, where masked priests took the parts of Dionysus, Silenus, Core, nymphs and satyrs. Grünwedel considers the masks to be representations of the eight Protectors of the Faith (see *Mythologie des Buddhismus in Tibet und der Mongolei*; Leipsic, pp. 168 *sqq.*). There is another attempt at an interpretation by L. Waddell in *Actes du xme Congrès international des Orientalistes*, Geneva, 1894, p. 169. See also the account of the mystery play in *India and Primitive Christianity*, by A. Lillie, London, 1909, pp. 241 *sqq.* and p. 246.

Dance of masked monks in the monastery of Phayang.

Chinese costumes in the mystery play at Phayang.

The last stretch of tableland that we have been crossing up to now ends at the spur which forms the eastern side of the Phayang valley, thrusting forward as far as the Indus itself, whither the path is accordingly forced to descend. On a point of rock at the very end of the spur stands the monastery of Spituk (Pittuk), of which more later. Just beyond it an ample valley opens to the view, or rather a sort of bay among the mountains; in it lies Leh, the capital city of Ladak. The basin is a delta-shaped, slightly inclined plane covered with pebbles and bare sand. Its base is formed by the Indus, which here spreads out into a wide bed divided into numerous branches among little sandy islets covered with shrubbery and in summer with tall grass. In the background rises the Ladak range, covered from top to bottom with shining white snow —up to now it had been hidden by the labyrinth of outlying spurs which it sends down toward the Indus. We reached Leh after twenty minutes' trotting on the perfectly straight road that runs through the sandy plain. The city lies at the apex of the triangle, at the meeting of the short valleys that descend from the principal range, and about 4 miles away from the Indus.

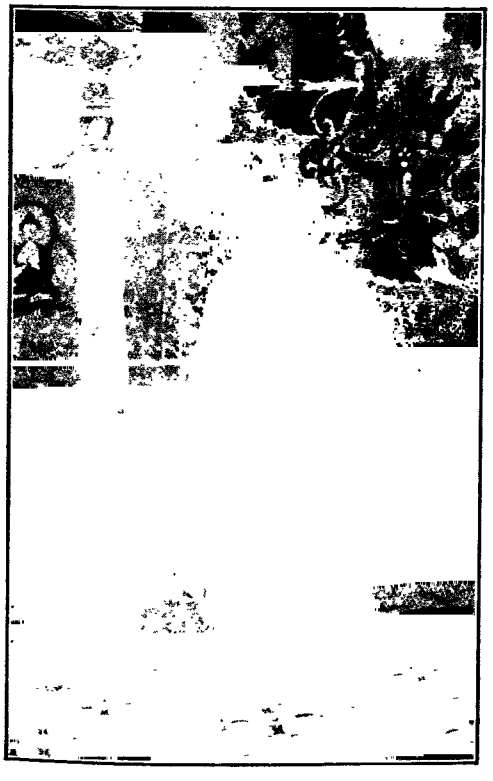
The trees and bushes of the oasis can be seen from afar, and as we drew nearer, the city gradually stood up from the plain, shaped like an amphitheatre, dominated by the imposing royal palace, behind which against the sky was a hill crowned by the buildings of a little *gonpa*. One enters Leh by a passage or shallow portico, which leads beneath a two-storeyed structure; it has a wooden gate that looks as though it led into a courtyard, instead of which it gives access to the wide street of the bazaar. Beyond this we passed through a suburb of the city and in a few minutes arrived at the bungalow of the Residency. It was the afternoon of March 2nd. I had most generously been offered hospitality at the Residency, the Resident himself habitually spending the winter in Kashmir.

On our entrance we were welcomed by several officials of the Maharajah's government, and by a representative of the *kushok*, the head of the monastery of Himis; he offered me, spread out in both hands, the ceremonial *katag* or scarf, which in Tibet, Nepal, Bhutan and Ladak serves almost the purpose that the visiting card does with us. It is made of silk muslin or starched cotton, with long fringes, and is sent as a mark of courtesy with any sort of message.

CHAPTER VI

LEH

European visitors to Leh from the times of Azevedo and Desideri to our own—The station at Leh—Arrival of the second group of members of the expedition—The Moravian mission at Leh—Social life, festivals and entertainments—The dynasty of Ladak and a brief summary of its history—The castle—The *kushoks*—Religious ceremonies—The hermit of Leh—The *kurim*—The temples of the Namgyal Tsemo—Funeral rites—The Trashi Teu *chorten*—The Mussulman cemetery—Sheh, Tikse and Chimre—Himis and the story of the prophet Issa—Climate of Leh—Wild and domestic fauna—Organization of the summer campaign.



THE first Europeans to reach Leh were Francisco de Azevedo and Joao de Oliveira, Portuguese Jesuits, who came from Tsaparang in Western Tibet, via Hanle and Gya. They remained only two weeks, in the autumn of 1631, and make merely passing mention of their visit.[1]

Almost a century later, Father Ippolito Desideri arrived at Leh, with his companion Emmanuel Freyre, in the course of their journey from Kashmir to Lhasa. They remained a little more than three months, between May and August of 1715, being cordially received and entertained by the king, Niyma Namgyal.

[1] C. Wessels, S.J.: *Early Jesuit Travellers* (1603–1721), The Hague, 1924, pp. 101 *sqq.* I agree with Captain Featherstone in entertaining doubts of the view held by Colonel R. Meinertzhagen, that Leh was in those days in the neighbourhood of Spituk. The error arose from the statement by Azevedo that Leh was half a mile from the Indus. See Geog. Journ., Vol. LXX, 1927, pp. 129 and 595.

Desideri gives a clear and succinct account of Ladak and its people, such as might have been written to-day:

"Second Tibet, or Lhata-yul, is two months' journey in length; it borders on the north with the kingdoms of Kaskar and Yarkand; on the south with the realm of Collahor (Kulu); on the west with Lesser Thibet or Baltistan; and on the east with the great desert of Ngnari Giongar.[1] It is mountainous, sterile and altogether horrible. Barley is the chief product; a little wheat is grown, and in some places apricots. Trees are scarce, so wood is hard to procure. There are many sheep, especially very large geldings; their flesh is most excellent and their wool extraordinarily fine. Musk deer also exist. In valleys at the foot of mountains and also near streams the natives find a good deal of gold, not in large nuggets, but as gold dust.

"They eat meat and the flour of roasted barley; and drink ciang (*chang*), a certain sort of beer made from barley. Their clothes, made of wool, are of suitable shape and make. They are not at all arrogant but rather submissive, kindly, cheerful and courteous. The language of the country does not differ much from that of Third Thibet; and the religion, and books relating to religion, are similar. There are numerous monasteries and a great many monks; their superior is a chief Lamá, who, to qualify for the post, must have studied for some years in a university in Third Thibet, as must any monk who aspires to be promoted to a higher grade.

"A number of merchants from Kascimir engaged in the wool trade live in this Kingdom and they are allowed to have mosques and openly to hold their religion. Occasionally merchants come from the kingdom of Kotan with well-bred horses, cotton goods and other merchandise. Some come from Third Thibet by way of the great desert, and bring tea and tobacco, bales of silk and other things from China."[2]

After Desideri almost a century went by before another European visited Ladak. This was Moorcroft, that adventurous spirit, who arrived there in 1820 with a young companion, Trebeck. They spent two entire years there, trying in vain to get permission to enter Eastern Turkestan, where they purposed to buy horses to renew the stock in India.[3]

Even at the time of Moorcroft's visit there was hanging over Ladak the menace of invasion by the Dogra Sikhs. But the actual conquest only began 12 years later, in 1834, at which time Dr. Henderson was at Leh, in the guise of a Mussulman—an unnecessary precaution in so tolerant and hospitable a country as Ladak.

Vigne likewise came to Leh, during one of his journeys to Baltistan, in 1836; not

[1] There is a little confusion here with regard to the situation of the countries bordering on Ladak. Ladak is enclosed to the south by the south-western provinces of Tibet, Hundes and Ngari Khorsum; on the east is the great Tibetan plain of Rudok, inhabited by nomads. And to the south-west Ladak is shut in by the diagonal line of the Himalayas.

[2] Edition of F. De Filippi, pp. 77-78.

[3] Moorcroft returned to India but left it again almost at once to go across Afghanistan to Bokhara. He always travelled by routes at that time unknown to Europeans. After he came back from this journey, he and his two companions, one of them Trebeck, died one after another, it was said of fever. The account of these journeys is given in the diaries and correspondence of Moorcroft and Trebeck, collected in two volumes by Hayman Wilson, already cited.

a favourable time to observe or study Ladak, distracted as it was by long-standing war and occupied by an invading army.

Upon the completion of the conquest, as we have seen above, Baltistan and Ladak became provinces of the new kingdom of Jammu and Kashmir; and the delimitation of the political boundaries between it and Tibet and the English provinces of Spiti and Lahul, caused other Europeans sent by the government of India to come and stay in Ladak.[1]

Although Ladak had now become accessible to everybody, hardly anyone took advantage of the fact for several years. The first to do so as a private traveller was Roero di Cortanze, in 1853; he gives a lively description, full of interesting detail, in his three little volumes.

Three years later the brothers Robert and Hermann von Schlagintweit arrived at Leh on their way to Khotan, and again on the return journey.[2]

In 1865 a permanent English commissioner was established at Leh (for the summer months) to protect the trade between India and Turkestan from the extortions of the Maharajah's officials. And in the same year W. H. Johnson passed through on his way to Khotan, whither he went by a different route from the one followed by the brothers von Schlagintweit.

From that time on, Leh became less a goal for travellers than a passing stage for those bound farther on. Thus in 1867 and 1868 Shaw and Hayward stopped there on their way to Yarkand and Kashgar; in 1870 and 1873 there were the two missions, or rather embassies, of Sir T. D. Forsyth, sent by the Government of India to the Atalik Ghazi, then ruler of Eastern Turkestan; and among the most illustrious of the later comers it will suffice to mention Sir Aurel Stein and Sven Hedin.

For 16 days after I reached Leh, caravans kept coming in with provisions collected in Baltistan and at Kargil. I continued to send on the stores, together with what had been already collected at Leh, although the winter season created difficulties which appeared at times insurmountable. I will speak in more detail farther on of the route chosen for our journey out of the Indus valley into that of the Shayok, and up the latter to the Karakoram. Here it is enough to say that it crossed the Ladak range by the Chang-la, a pass 18,370 feet high; hence my insistence upon the immediate transportation of such a bulk of goods across such high mountains met with protests that did not seem unreasonable. But the route to be covered was too long, the programme of work to be done in the Karakoram too large, for us to spend weeks and months in waiting for a more propitious season.

So I began by sending all the available loads up the Indus valley to Chimre, a village

[1] Among them Thomson and Henry Strachey, whose works I have cited; also Cunningham, to whom we owe the first comprehensive work which we possess on Ladak, published in 1854. There is also much interesting information in the work of Drew already cited.

[2] H. von Schlagintweit, *op. cit.*, Vol. IV, p. 203.

at the foot of the Chang-la. Fresh snow was falling every day in the high mountains and the pass was not negotiable even by men without burdens. But necessity is the mother of invention, and we finally found a way to overcome the obstacle. We sent forward a herd of *zho* and yak, almost 100 head; these, once driven into the valley leading up to the pass, with 60 or 70 men to urge them from behind, did finally open up a passage through the deep snow, cutting a wide trench through which a second batch of animals could follow them with the loads. It took five days to open the pass; and during the ensuing ten, between March 20th and 30th, 800 loads were sent across the range into the Shayok valley. Other caravans, collected on the spot, carried them thence up the valley.

It was an effort which could succeed only by the good will and constant co-operation of all the local authorities and the officials of the Maharajah. And where the public officials could not reach, above all in the requisition of almost all the *zho*, yak and horses in Leh and the vicinity, we benefited by the influence and authority of the *kushok* of the monastery of Himis and his treasurer or *chagzot*.

So much for our methods. As for putting them into execution, certainly their success was principally due to the energy and intelligence of a priceless assistant to the expedition, Ghulam Rasul Galwan, the ablest and best "caravan-bashi" I have ever known. He was a Mohammedan from Leh and spoke, besides Tibetan and English, Persian and the Turki language of Central Asia. He had accompanied travellers and explorers in Tibet, Pamir, Central Asia, across China and as far as Japan. The porters trusted him and would follow wherever he led; and he had friends and admirers everywhere, among Ladakis and Tibetans, among the Kirghiz and Sarts of Turkestan; it was a great piece of good fortune to have him as "caravan-bashi" almost up till the end of our work.[1]

On March 16th Dainelli, Antilli and Ginori joined me at Leh. Alessio and Abetti, accompanied by Petigax, came on the 22nd, after having completed the stations of Kargil and Lamayuru; they rapidly made the necessary preparations for setting up another station at Leh, in the unoccupied rooms of the bungalow, and in the neighbouring fields above the city. They proceeded as usual with the gravimetric, magnetic, astronomical and topographical work, and with the recording and computation of the wireless time-signals. As for Antilli, these chapters contain sufficient evidence of his work to make it unnecessary for me to speak of it separately in detail.

Ginori resumed the meteorological observations; beginning by comparing our instruments with those of the observatory at Leh, which is the highest station in Asia (11,500 feet), established in 1882, 40 years before; and then proceeding to the regular readings with the instruments and to launching the pilot balloons for the study of the winds.

[1] See his inimitable autobiography *Servant of Sahibs*, edited by Mrs. Robert Barrett, Cambridge, 1923.

And—apropos of balloons: it was only at Leh that we learned that some of those which were released the previous November at the high station of Wazul Hadur above Skardu had been carried by the north-west wind into Tibetan territory and come to earth on the Rudok plateau, east of Leh. The mysterious bodies fallen from the sky vastly impressed the populace, whose minds are always inclined toward the supernatural and the evil powers of genii and malignant spirits. The authorities took up the matter and sent the supposed shooting stars to Lhasa. A *zemindar* (landed proprietor), who did not at once report a balloon which had fallen on his land, was punished. The Lamas turned them to advantage by ordaining a series of long and complicated exorcisms. News of the balloons even penetrated to India and was reported in the newspapers.[1]

Dainelli left Leh on March 27th upon an excursion which lasted nearly a month, into the upper valley of the Indus, and thence up to the Rupshu plateau; after which, crossing the Ladak range, he visited the large lake of Pangkong.

By the 3rd of April the geophysical observations were finished, and my companions prepared for new work.

The Trigonometrical Survey of India wished us to make a gravimetric station in a place called More, situated about 15,420 feet above sea-level on the great Rupshu plateau, which rises south of Leh, between the Himalayas and the upper valley of the Indus. Captain J. P. Basevi, of the Trigonometrical Survey, had already taken gravimetric measurements there in June, 1871. Two months later he had died, and the calculation of the data he had procured had led to such singular results that it seemed necessary to repeat the observations in order to get either a correction or a confirmation of them. Accordingly we arranged our programme so as to permit us to make a station at More, which was not included in the original programme and lay outside the itinerary of the expedition. Alessio, indeed, intended to make a station complete in all respects, like the others established throughout the campaign, including astronomical and meteorological observations and the determination of longitude by wireless.

People at Leh, accustomed to cover the caravan routes at all seasons, were unanimous in telling us that we were not likely to encounter serious obstacles in reaching or crossing the plateau; indeed, they said there would be very little snow. All the necessary scientific equipment was got ready, and on April 7th the caravan left Leh, with Alessio in command, accompanied by Abetti, Ginori and Petigax.

They had to go up the Indus valley for three stages, as far as Upshi, on the left bank of the river. Here they began the climb by the Gya valley. At the head of this valley is the Takalung-la, a pass 17,390 feet high; by it one reaches two large open valleys, the Debring and the Rukchen, which slope down to the Rupshu plateau. The transport and the preparation of the road had been entrusted to the *zaildar* of the district, who was also a lama of the monastery of Himis—a man of authority, intelligent and

[1] See *The Pioneer* of India, for September 3rd, 1913, p. 12.

energetic, who arranged everything most satisfactorily. The road was inspected beforehand and the Takalung-la was found to be obstructed by heavy snow; the advance parties therefore preferred to open the way to another pass, north-east of the Takalung, and nearly 1,000 feet higher.

The caravan, with 112 porters and some 40 yaks, went up the Gya valley without trouble as far as a stage about 3,300 feet below the col. That was on April 11th. The next morning (Easter Day) they set off for the top, which they reached toward noon. Here an unpleasant surprise awaited them. Contrary to the inform-

The geophysical caravan.

ation obtained from people who knew the region, the valley toward Debring, and the plateau, were covered with a deep layer of snow, a white uniform blanket where not even a rock showed its head. It would have been impossible for the heavily laden caravan to open a track in deep snow for 25 miles and more, without spending more time than the amount of available food would permit. And thus they were, by common consent, obliged to abandon the undertaking. To set up a station where they were would in no way have contributed to a solution of the problem which interested the Indian Trigonometrical Survey; so there was nothing for it but to return to Leh, where they arrived on April 15th. On the 22nd, Dainelli also returned, after a most interesting and arduous excursion, which is described in Chapter VIII. And a week

later, on the 29th, our numbers were finally completed by the arrival of the second European contingent: Marinelli, Wood, Alessandri and Spranger, with the two Indian surveyors Jamna Prasad and Shib Lal. Wood had also brought with him two Gurkha orderlies, stout mountaineers from Nepal. They were faithful and disciplined soldiers, excellent huntsmen, practised in all the details of camp life. They had crossed the Zoji-la on April 18th, finding it in full winter dress, covered with snow as far down as Dras.

Marinelli allowed himself scarcely a day of rest at Leh; he left at once with Dainelli on a six-day excursion in the Zanskar district, which will be described hereafter.

Wood and Spranger spent the two weeks before our departure in excursions to the range behind Leh, where they fixed points of reference for the survey of the march up the Shayok valley.

Alessandri and Ginori collected another series of meteorological observations and measurements of solar radiation; they also made preparations for the work which they were to do later on the plateaux of the Karakoram.

And—just as they had been at Skardu, perhaps to an even greater extent—all these activities were diversified by the things we found to interest us at Leh and in the region round about.

Of all the settlements we had seen since we left Srinagar, Leh was the only one which seemed like a little city. It encircles the base and clambers up the lower slopes of a side-spur of the valley, at the foot of the massive and imposing royal palace, or rather castle, erected on a shoulder of the same spur. Above it are some remains of fortifications and a group of temples and chapels. Along one of the sides of the spur runs the wide bazaar street of Leh, which serves also as a polo-ground, made some 70 years ago, after the Dogra conquest. On the mountain-side it is bordered by a wall, and a row of poplar-trees; on the other are the houses and shops—two- and three-storey buildings—of the merchants. The bazaar leads into a little square, beyond which lies the older quarter of Leh, and still farther on, the fine bungalow of the English Resident, standing in a little grove. There I spent the two and a half months of my sojourn at Leh. Close by was the bungalow for travellers, large and well built, as was proper to a place of such importance.

A just idea of that importance can be had only in summer, when the caravans from Kashmir, Turkestan and Tibet arrive at Leh and a good deal of business is done. Then the bazaar is full of a crowd made up of all the races and all the costumes of Central Asia —Khotan, Yarkand and Kashgar—merchants from Russian Turkestan; from Spiti, Lahul, the Punjab, Kashmir, Afghanistan—with a mixture of Tibetans and Nepalese.[1]

[1] Roero di Cortanze (*op. cit.*, Vol. I, p. 278) states that a Ladaki caravan leaves every two years for Lhasa, and meets on the way a Tibetan caravan coming from the other direction. Besides this there is a yearly caravan to and from Turkestan. According to C. Dalrymple Bruce (*In the Footsteps of Marco Polo*; London, 1907, p. 26), there is an official trade caravan, led by a representative of the

But even in the winter Leh impresses one as busy and lively, particularly by comparison with sad and sleepy Skardu. Leh is a true little capital, the seat of a tiny cosmopolitan world, with various classes and categories of citizens; these are much more curiously and interestingly diversified than those which form the social sets of many of our small provincial cities.

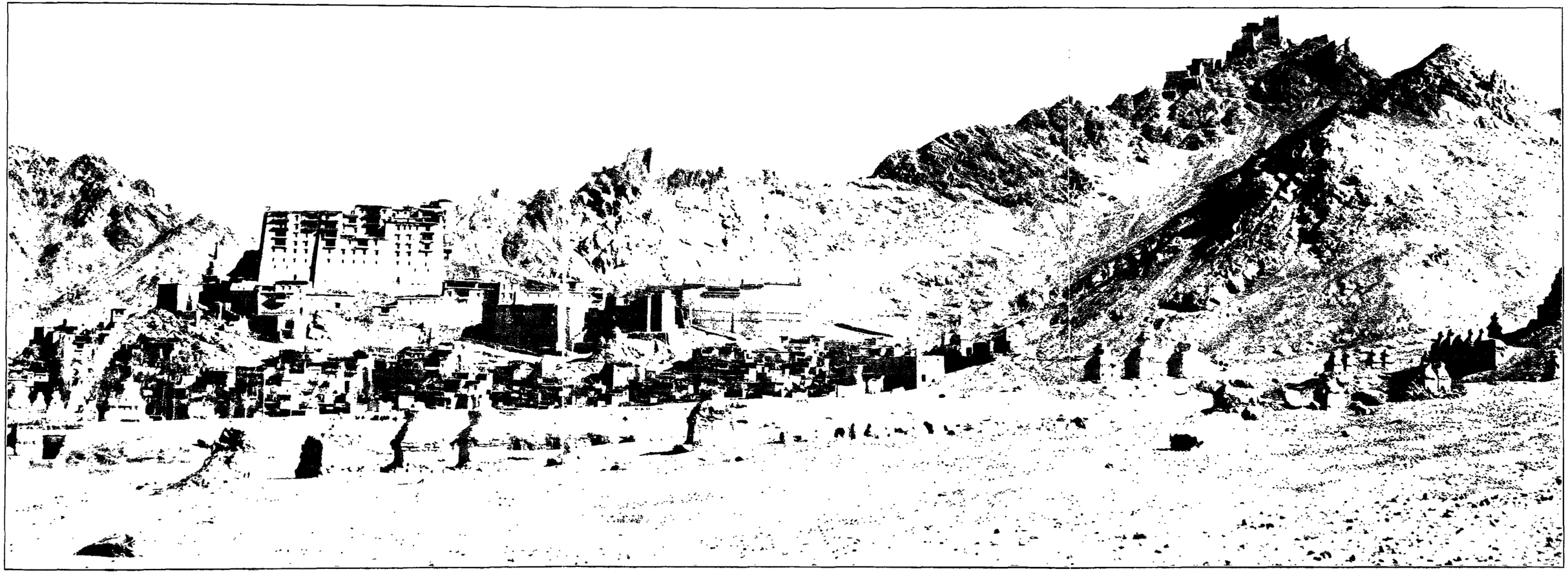
Setting aside the Resident, who is there only in the summer, and beginning with

The bazaar at Leh.

those nearest to ourselves, there is at Leh a Moravian mission, an offshoot of the one established about the middle of the last century in Lahul, a province under English

Maharajah, which leaves Leh for Lhasa every three years, carrying, in addition to merchandise, a present of the value of 135 rupees to the treasury of Tibet, a formal survival of the tribute which Ladak was expected to pay to the Grand Lama before the Dogra conquest—not in token of political subjection but in recognition of the spiritual authority of the head of Lamaism, like the Peter's pence of Roman Catholic countries. For a description and statistics of trade at Leh, see Cunningham, *op. cit.*, pp. 238–56.

Namgyal Tsemo



LEH

sovereignty, on the borders of Ladak.[1] It has counted in its ranks a number of learned missionaries, to whom we owe the larger share of what we know of the language, the dialects, the history and archæology of Ladak.[2]

At the time of our stay at Leh, the head of the mission was the Rev. F. E. Peter, with the experience gained by 15 years' residence at Leh, with his family. He aided the expedition actively and with advice from the time when it was in preparation. Dr. Peter was assisted in his work by H. F. Burroughs. The mission has a well-equipped hospital at Leh, at that time in charge of Dr. Reeve Heber and Mrs. K. M. Heber, both physicians,[3] assisted by a nurse. All kinds of patients stream into this hospital from all over Ladak: the blind suffering from cataract, so frequent in the region between the Himalayas and the Karakoram; and the poor wayfarers frostbitten on the way across the mountains, with gangrenous hands and feet, ears and noses. The Hebers also visit the sick of Leh in their houses. And Miss Birtill taught in the school, where the little Ladakis learn to read and write their own language and a bit of English, to use a needle —and to wash themselves. Her assistant was Joseph Thsertan, a Christian Ladaki,[4] who made us the best of guides on our excursions and our visits to the villages and monasteries in the neighbourhood of Leh. No matter how few converts the mission may make, its civilizing and educating influence goes far to justify its existence.

Among the officials at Leh was the Khan Sahib Aziz-ud-Din, a Mohammedan, commissioned by the government of India to control the trade in *charaʒ* (hashish), which is introduced into India from Central Asia, paying a heavy duty. The government of Kashmir was represented by the *tehsildar* Natha Singh and his *naib-tehsildar* or vice-prefect; both Hindus and both, of course, subordinates of the *waʒir-i-waʒarat*, who returned from Skardu to his house in Leh in the month of April and continued to be the guardian angel of the expedition.

With all these people we were on the most cordial and friendly terms, being invited by them in turn to receptions where we usually met the whole colony and the most important citizens of Leh. And they got up for us various festivals and characteristic

[1] About 1890 an attempt was made to found a Roman Catholic mission at Leh, but it was soon suppressed, perhaps owing to the difficulty of the language.

[2] I refer to H. A. Jaschke, of the first mission at Lahul, of whom Markham (*op. cit.*, Introduction, p. cviii) says that he had more knowledge than any other European of modern Tibetan and its dialects; and to Karl Marx, who translated *The Book of the Kings of Ladak*, the most important historical document of the district and the basis of the excellent History of Ladak, by another missionary, A. H. Francke, whom I have many times quoted. Francke is known for his many and original researches in the folklore, epigraphy and archæology of Ladak; the most important are found in his book: *Antiquities of Indian Tibet*, two richly illustrated volumes, published by the Archæological Survey of India, Calcutta, 1914.

[3] Authors of *In Himalayan Tibet*; London, 1926.

[4] He is now called the Rev. J. Gergan; and he has become an evangelical minister at Kilang, another settlement of the Moravian mission.

Ladaki women dancing.

displays, the sort of thing known in India as *tamasha*. Their music is simpler than the Balti music. It lacks the long trumpets, which in Ladak are reserved for sacred music; also the cylinder-shaped drums which are beaten with the fingers. There are only the conical brass drums used in pairs and beaten with little sticks—and the fifes or clarinets. But on the other hand, the women also dance in Ladak, though apart from the men. We saw some 30 of them, from the well-to-do families of Leh, to judge by the richness of

Dancers in costume.

their costumes, head-dresses and ornaments of gold, silver and precious stones; the effect was picturesque and delightful. The dance consists of a slow walk, with little steps, in single file, describing circles, spirals or serpentines, accompanied by rhythmic movements of the hands, with arms outstretched. At every few paces each dancer executes a turn. The weight of the great furred mantle prevents any more active movement. But the men's dances are livelier. A group of four or six men take part, wearing special costumes for the occasion. There are always one or two in richly embroidered Chinese garments, and they have two kinds of head-gear: a large felt

cap turned down at the side, something like that worn in Sardinia [1] and a gilded cone from the peak of which a fringe of gold threads hangs all round. The footwear is very varied: there is the Ladaki *pabbu* already described, the Chinese felt shoe with its thick white sole, and the Yarkand boot of soft leather, worn with a slipper over it.

After the Ladaki dances some Spiti players gave us a long performance, a mixture of ritual, magic and mountebankery, in front of a little shrine with its Buddha, beating

Spiti dancers.

the cymbals and shaking the little bell of the cult, revolving the prayer-wheel and executing whirls and dances and mimic scenes, in which a white-faced clown took part. There followed displays of dexterity with sword and dagger; and long incantations ending in a mock-miracle: one man lay with a stone block crosswise on his abdomen and his confederate split it in two by hurling a large round pebble at it.

A variety of other dances were given: two little girls from Spiti danced with charm-

[1] Drew says (*op. cit.*, p. 240, where there is an illustration) that this was the original form of the Ladaki cap, which later gave way to the little skull-cap and to the tam-o'-shanter with wide turned-up brim lined with lamb's wool.

ingly graceful movements and attitudes; and there were performers from Lhasa with original costumes and flat masks inlaid with mother-of-pearl; likewise Balti and Brokpa dances. Lastly, two groups of masked lamas from the monasteries of Phayang and Tikse, with their own music—incomparably livelier dancers, these, than any of the others.

A large crowd surrounded the three sides of the square where the performance

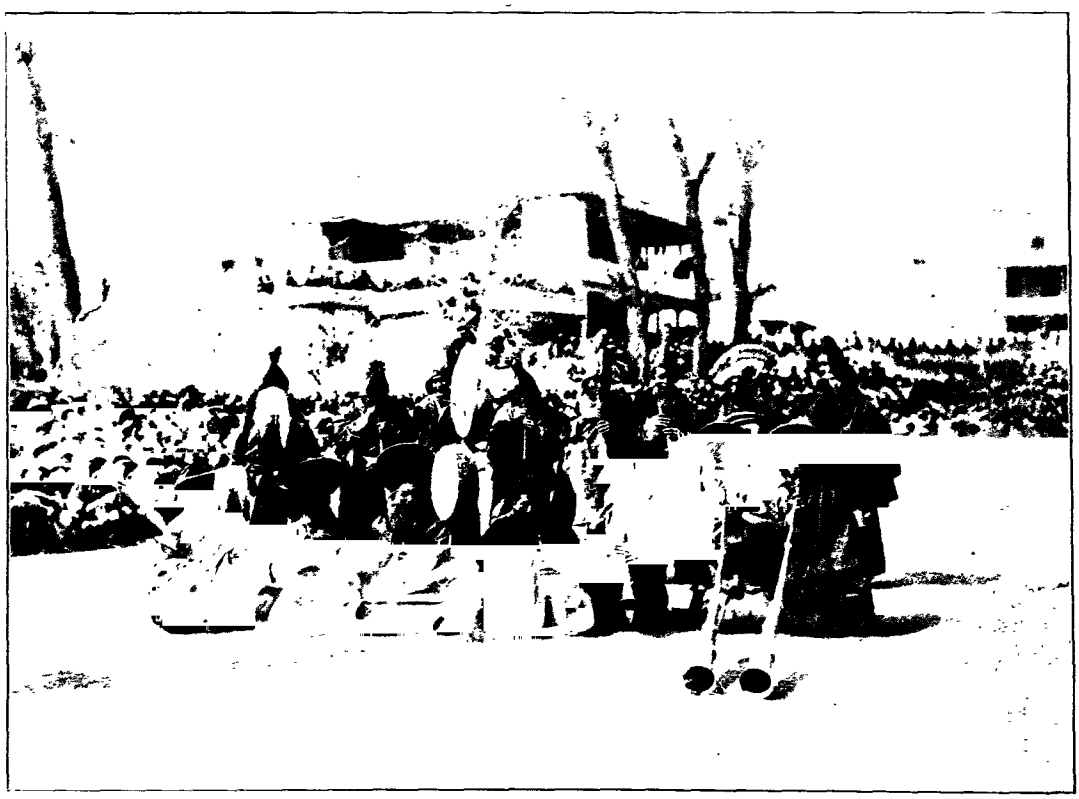
Troupe of dancers from Lhasa.

took place, or stood on the terraces of the houses: hugely entertained, also excited by copious draughts of *chang*, the beer of Ladak, which was peddled about in earthenware jugs among the crowd. In the intervals tea was served to the privileged guests at separate tables, one for each creed: Hindu, Sikh, Mussulman, besides one for the *kushok* of Himis, one for us Europeans, and one for the crown prince.

This royal prince, however, enjoys but an empty title. For the Sikhs deprived the King of Ladak of all political and administrative power, leaving him nothing but the little village of Stok as his apanage.

The kings of Ladak spring from a very ancient stock. The *Chronicle of the Kings*, translated by K. Marx, contains the entire line of descent from A.D. 900 down to 1842. But it is a chronicle only from 1400 onwards; up to that date it is little but a list of names.[1]

It was only toward the year 1000 that Ladak became a nation and a united king-



Monastery band at Leh.

dom under kings derived from Central Tibet. During the preceding centuries the Mons and Dards had entered Ladak and introduced agriculture to the nomad Tibetans;

[1] Besides the chronicles of the kings, there are others giving the lineage of several of the principal vassals, also the history of the monasteries, of which but few have been collected and translated; there are edicts and an extensive epigraphic collection, useful for comparison with the chronicles. To these must be added the foreign documents: *Kashmir Stories and Songs* (translated by Sir Aurel Stein) and the Chinese and Tibetan chronicles (among these one translated by Emil von Schlagintweit). Cunningham gave us the first outline of a history of Ladak, from the 16th century (*op. cit.*, pp. 316–53), taken from a local chronicle; but since then much new historical material has come to light, on which is based Francke's history of Ladak. From it I have taken the few fundamental facts given above.

and gradually, by dint of the exchange of agricultural and pastoral products, the races mingled and there arose many little Dard and Tibetan principalities. With the advent of the Central-Tibetan dynasty, the Buddhism of Ladak surrendered to that of Lhasa; and later, toward 1400, the great reformer Tsong Khapa sent a mission to Ladak, from which resulted the establishment in Ladak of the various monasteries of the yellow sect.

At about the year 1500 this dynasty, called "Lha chen," The Great God, was succeeded by that of the Namgyal—"the Victorious." And in fact the first Namgyal did reduce several of his chief vassals to subjection and ruled over a Ladak which was larger than ever before, comprising a great part of what is now Tibet proper.[1] But his successor, Jamyang Namgyal, was not so fortunate—or not so valorous. In his time Ladak was invaded by Balti forces under Mir Ali Sher Khan,[2] whom I have mentioned in the account of Skardu. The Ladaki army was routed, the king taken prisoner, the monasteries sacked. But Ali Sher contented himself with plundering; he gave the throne back to Jamyang together with one of his own daughters to wife. If this was policy, designed to convert Ladak to Islam, it failed; for the Ladakis, forsooth, made the discovery that their new Mussulman queen was an incarnation of the White Tara, one of the two famous wives of the Tibetan king Sron-tsan-Gam-po, one a Chinese, the other a Nepalese princess, who, according to tradition, introduced Buddhism and civilization into Tibet in the eighth century, and then were deified as incarnations of the two Tara goddesses.

At the beginning of the 17th century, in the reign of Sengge, the successor to Jamyang, there came to Ladak a famous lama of the red sect, Stagtsang Raschen (or Raspa), a great builder of *mani* walls[3] and monasteries, whose statue appears in some of the temples among other divinities (see illustration, p. 215).

As for King Sengge, it was he who built the great castle of Leh, and various monasteries and colossal statues of Buddha. He completely restored the kingdom, and extended its boundaries into the valley of the Brahmaputra, as far as seven stages from Shigatse.

Sengge's conquests were completed and consolidated by his son Deldan. But the next king, Delegs, in his eagerness to emulate the ancestral glories of his realm, brought it to ruin instead. Toward the middle of the 17th century he was imprudent enough to attack Tibet anew; but he found himself facing quite a different

[1] There seems to be no mention in the Ladaki; chronicles of the invasion of Sultan Said, whose soldiery from Kashgar harried Ladak and Baltistan for two years (see Chapter III, p. 44). This must have happened during the reign of the first Namgyal, but Francke in his *History* does not mention it.

[2] Francke (*History*, p. 92) makes Ali Sher the duke of Khapalu; while in Cunningham (*op. cit.*, p. 35) he figures as founder of the Skardu dynasty. Francke and Cunningham also vary slightly in their dates.

[3] See note on p. 117, Chapter V.

adversary, for in the meantime that country had become a dependency of Mongolia.[1] The Ladaki army was defeated, the land invaded and sacked. King Delegs sought shelter in the fortress of Temesgam and invoked the aid of Aurangzeb, the Mogul emperor of India. His prayer was answered and the Mogul army routed the Mongolian-Tibetan host in a great battle at Bazgo. But the king paid for the victory with a forced conversion to Islam, and by the loss of his wife and one son, who were taken to Kashmir as hostages for the genuineness of Delegs' belief in Allah and his prophet. It was at this time that the large mosque was built which still stands at the upper end of the bazaar.[2] But all these concessions were in vain; for scarcely had the Mogul army turned its back when the Mongolo-Tibetans reappeared to make conditions in their turn.[3]

The great kingdom which had existed for about a century and a half from the time of the first Namgyal, finally disappeared, leaving a Ladak of about its present size, and burdened with an annual tribute to Lhasa. Thus reduced, it endured for another century and a half, with a gradually declining dynasty that had to submit to constant raids from the neighbouring small principalities—precursors of the final scene.

The Sikhs, masters of Kashmir from 1815, were not a people to be stopped by the Himalayas, a mountain barrier which history had proved not insurmountable; and before many years they determined to press beyond it. But Ladak was no easy prey; the task required years and the sending of four successive armies.[4]

The campaign began in the summer of 1834, with 10,000 men led by that able and plucky general Zorawar Singh. The Ladakis, numbering 5,000 and badly armed, were defeated in two battles, but the Sikhs did not manage to get beyond Pashkyum before the winter interrupted their operations. The next spring they invaded the Indus valley, and dispersing the Ladaki forces got as far as Bazgo, where King Tsepal sent messengers asking for peace. He was left in possession on payment of an indemnity and an annual tribute.

But a year afterwards the Ladakis rose, and the Sikhs had to undertake another campaign (1835–6). The king was dethroned for a time; the fortresses of Temesgam and Bazgo were dismantled, and the Dogra fort at Leh was built, the one which stands

[1] The Mongols held Tibet from 1643 till 1716, when they retired, having installed the Grand Lama of the reformed sect and invested him with the political and legislative power which he still holds.

[2] Perhaps there is a connection between this Islamic period in the history of Ladak and the strange custom still obtaining of secluding the queens of Ladak and making them go abroad veiled; whereas in the old mural paintings they are represented seated unveiled beside the king and before the people. Francke (*Antiquities*, etc., p. 88) says that the name of Delegs does not appear on the votive tablets nor the inscriptions in Ladak because the lamas wished to obliterate all memory of the apostate king.

[3] Bellew (*op. cit.*, p. 141 *sqq.*) gives further particulars of this period, probably taken from Mongolian historical sources.

[4] The story of the conquest is told in detail by Cunningham (*op. cit.*, pp. 332–53) as described by Basti Ram, a Dogra colonel who went through the campaign, and by Francke, who used Ladaki sources as well (*History*, etc., pp. 139–69).

in the plain below the Residency, four-square with large towers at the corners, exactly like the Sikh forts of Skardu and Kargil. A third minor military expedition was necessary to subdue an insurrection in Zanskar; on this occasion Tsepal was reinstated in his throne, but the tribute was raised from 9,000 to 23,000 rupees.

Zorawar Singh went back to Jammu, where he remained until 1840, returning to Leh with an army just in time to prevent the outbreak of another revolt. It was at this time that he undertook the conquest of Baltistan, as described in Chapter III.

His successes emboldened him to make plans for the conquest of Tibet, and to dream of the sack of Lhasa. He set about it when the season was already too far advanced, with a mixed army of Sikhs, Baltis and Ladakis. The Tibetans let them come on as far as the plateau in the neighbourhood of Gartok. There, 14,800 feet above sea-level, on December 10th, 1841, the two armies met. The battle lasted three days, until Zorawar Singh was killed in the mêlée; the Sikhs, exhausted by the struggle and the terrible, unaccustomed cold, were then easily discomfited, and with them the rest of the motley army. Only a few returned to Leh; of the others, some fell in the carnage which followed the rout, a large number were led prisoners to Lhasa, among them Ahmed Shah, the last independent king of Skardu, together with his son. The remainder died of cold and exhaustion.

This heavy blow to the powerful Sikh gave the Ladakis new hope of regaining their independence by dint of help from part of the victorious Tibetan forces then gathered at Leh. But the Sikhs, with admirable forethought, had provided for the sending of another army of 7,000 men, with two generals and artillery; even before it reached Leh the Tibetans had recrossed the frontier and the Ladakis had gone home. King Jigmet, who had succeeded Tsepal in the meantime, was dethroned, and the Sikh government assumed the direct sovereignty and administration of the whole of Ladak.

The present king is the third since Jigmet. He is called Sodnam; but like his predecessors he has a title which is a whole genealogy in itself: Jigmet Kungah Singhei Lundup Thinlis—Zangro Sodnam Nampar Gelvela. The Namgyal (Victorious) has been omitted; it would sound ironical under the circumstances. Reduced to the meagre revenue of his estate at Stok, he still lives in some dignity, and enjoys a popular regard not less than that paid to the *kushoks*. More than one of his ancestors, in fact, have been venerated as incarnations; and it is quite likely that a religious element enters into his favourable position. He is tall and thin, with a sad, resigned face; and dresses very modestly in a simple long red woollen garment like a tunic. But on the Ladaki New Year's Day [1] he puts on rich ceremonial garb; a mitre-shaped head-gear made of a

[1] Ladak, like Tibet, uses the Chinese chronology, based on a lunar calendar and intercalating a month every 3rd year. Years are reckoned in small cycles of 12 and large cycles of 60 years. The nomenclature is very complicated, being a combination of 12 names of animals with the names of the 5 elements. The year begins with the full moon of February. See Cunningham, *op. cit.*, p. 394 *sqq.*; Markham, *op. cit.*, p. 292; and Rockhill, *Land of the Lamas*, p. 241.

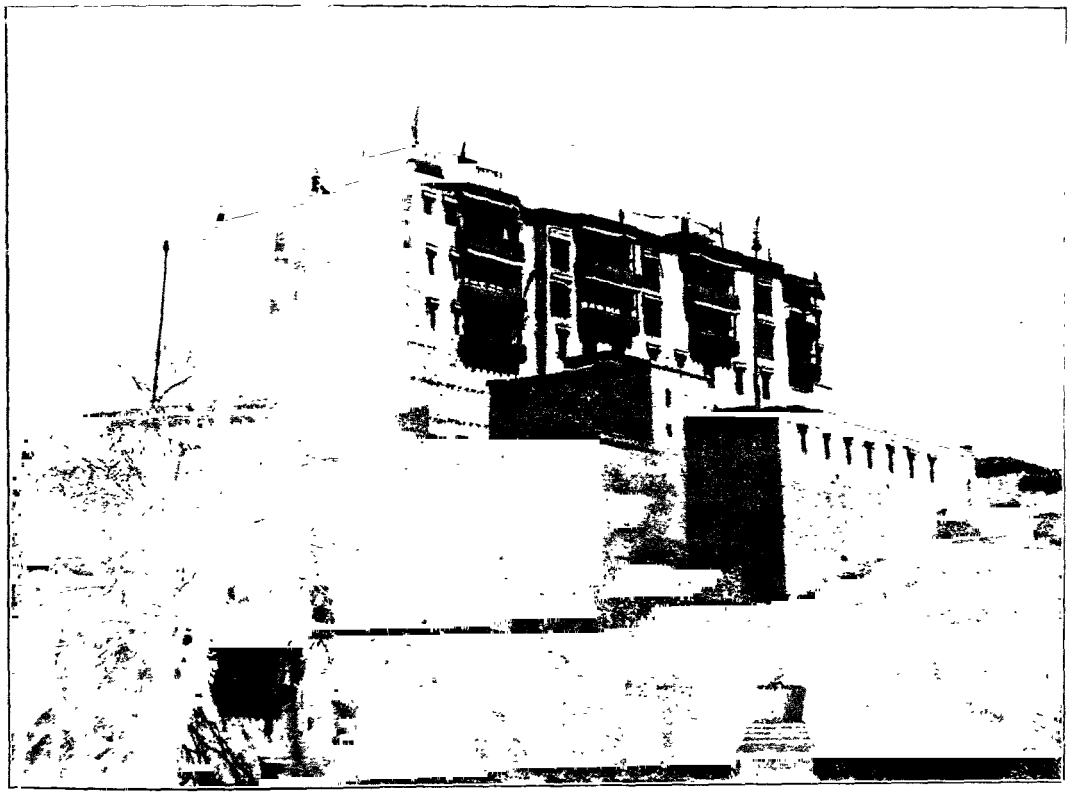
white silk scarf closed in front by a band of gold and turquoise ornaments; flowing vestments of yellow brocade bound round the body with a girdle of striped gold and silver tissue; and Chinese boots. At Leh he lives in a small, simple, poorly furnished

Sodnam, the former King of Ladak, in ceremonial robes for the New Year.

house; though on his property at Stok he has an imposing palace, on the left bank of the Indus opposite Leh—it looks, rising from its rock, very much like a large Riviera hotel. It was built about 1820 by Tsepal, the last independent king. Inside it is dismantled

and empty, save for a little temple or chapel, fitted out in the usual way and containing several valuable *tankas.*[1]

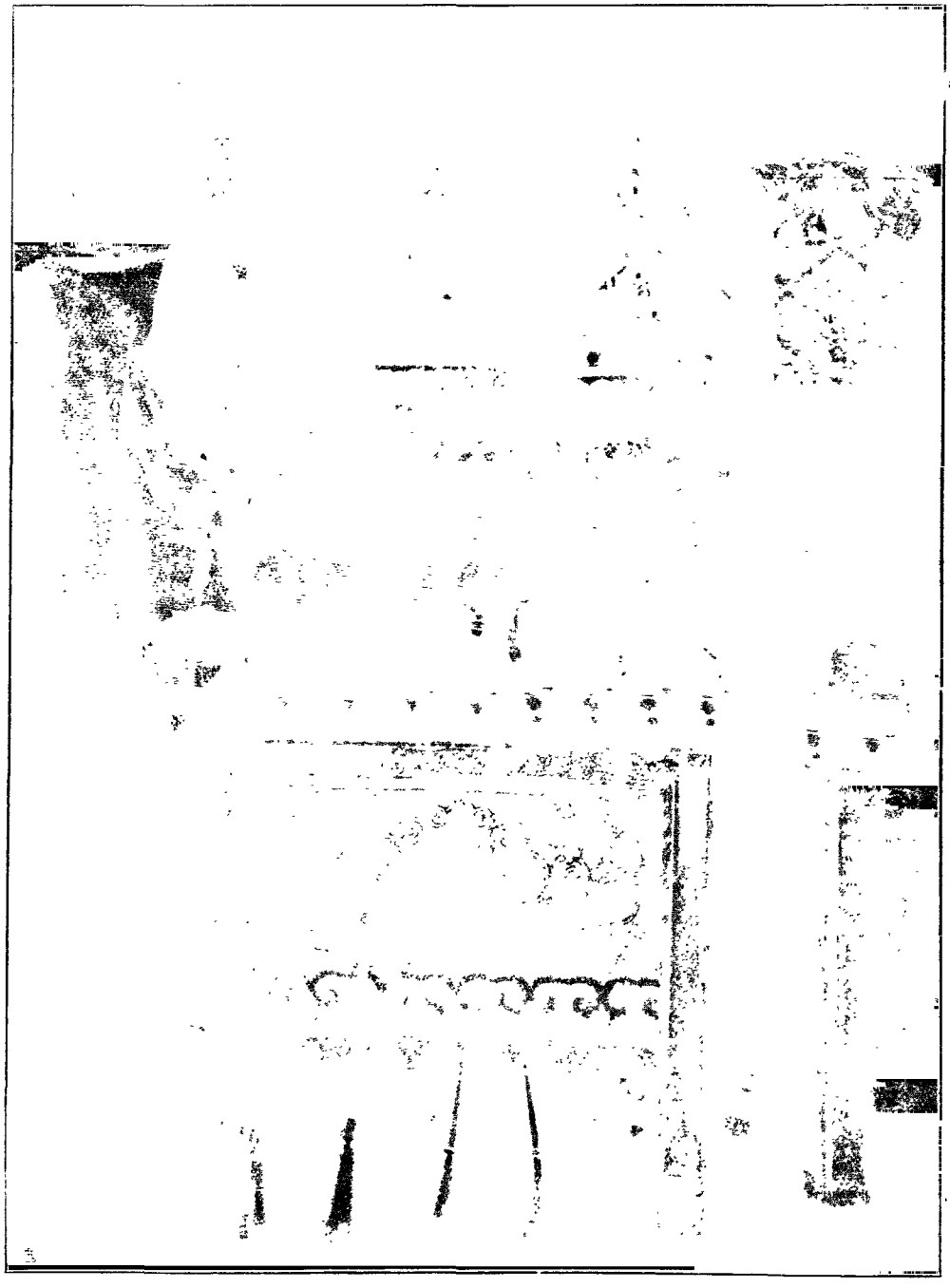
I do not know whether the royal family still possesses any rights over the great castle of Leh. It is a massive structure, resembling the pictures of the Potala, the Vatican of Lhasa, and was built, as I said, by King Sengge, at the beginning of the 17th century. It is supposed to have seven or nine storeys, but from the outside one only



The royal palace at Stok.

sees four, with wide windows and balconies on the south, rising above a high escarpment pierced by loop-holes. The whole is most impressive; but it possesses only one architectural detail worthy of mention, the so-called "portal of the lions." The wild beast heads carved beneath the ancon probably represent the heraldic animal of the founder: Sengge is Tibetan for lion. The castle was stripped of everything by the last Sikh army. And the temples, which are in charge of a lama from Himis,

[1] A year after our visit to Leh, in the spring of 1915, King Sodnam abdicated and withdrew to a monastery, investing his son with his empty title.



Altar in the palace chapel, Stok.

are bare by comparison with those of the monasteries. There is a fine mural painting in Chinese style, some standards and statues and the collection of sacred books.[1]

The state which the religious have managed to preserve in the new regime is a contrast to the melancholy position of the king. And in particular that of the high lamas and abbots, who are invested with the ancient spiritual authority from which they manage to derive so much temporal advantage. Certainly far and away the most important personages in Ladak at the time of our visit were the two *kushoks*, the heads of the lama-series of Spituk and Himis. The first belongs to the yellow sect, the second to the red,[2] and they live in great harmony, enjoying vast jurisdiction over a goodly number of monasteries, with full granaries—treasured up for the years of scarcity, when the grain is distributed to the peasants as a loan, at a high rate of interest.

Both these personages were pleased to treat us with great courtesy, always inviting us to the feasts given in their honour; they even consented to dine with us, a privilege probably enjoyed for the first time by any European—the meal being served to them apart by their own lamas.

The *kushok* of Spituk came from the family of the rajahs of Zanskar; he was the 19th incarnation of Bakula, the founder and first abbot of the monastery.[3] He was a typical prelate in appearance, with great dignity of bearing united to a benign aspect and exquisitely courtly manners, and perfectly corresponded to our ideas of a high ecclesiastical dignitary. Usually he resided at Spituk, the first Ladaki monastery of the "virtuous sect" of Tsong Khapa, built on the rocky ridge which rises at the end of the western rampart of the valley of Leh, with the Indus flowing at its base. Spituk is overlord of the monastery of Likir, a much older foundation which passed to the reformed sect after Tsong Khapa's mission to Ladak; other monasteries subject to her are Rigzon, which I have mentioned above, Sankar, a little above Leh, and Tikse, of which I shall speak shortly. There are others, governed by other *kushoks*, in the Nubra valley. They are all kept with much greater cleanliness and good order than the monasteries of the red sect, from which however they do not otherwise differ; the furnishings of the temples are identical. The reform of Tsong Khapa did not affect doctrine, but had reference rather to the rule and the monastic discipline.

[1] I understand that the government of Kashmir undertook the restoration of the castle of Leh in 1917.

[2] The red monks of Ladak seem to be a subdivision (Dugpa) of the Sakya sect, who in their turn derive from the school of Atisha, a reformer who lived four centuries before Tsong Khapa. (See Sir Charles Eliot, *op. cit.*, London, 1921, Vol. III, pp. 398–9). The red and yellow sects have always lived in harmony in Ladak, whereas in Tibet the reforms of Tsong Khapa led to sanguinary struggles between the new and the old sect, lasting until the 17th century, when the Mongols intervened and established the preponderance of the yellow sect, vesting the supreme political and spiritual authority in the Dalai Lama.

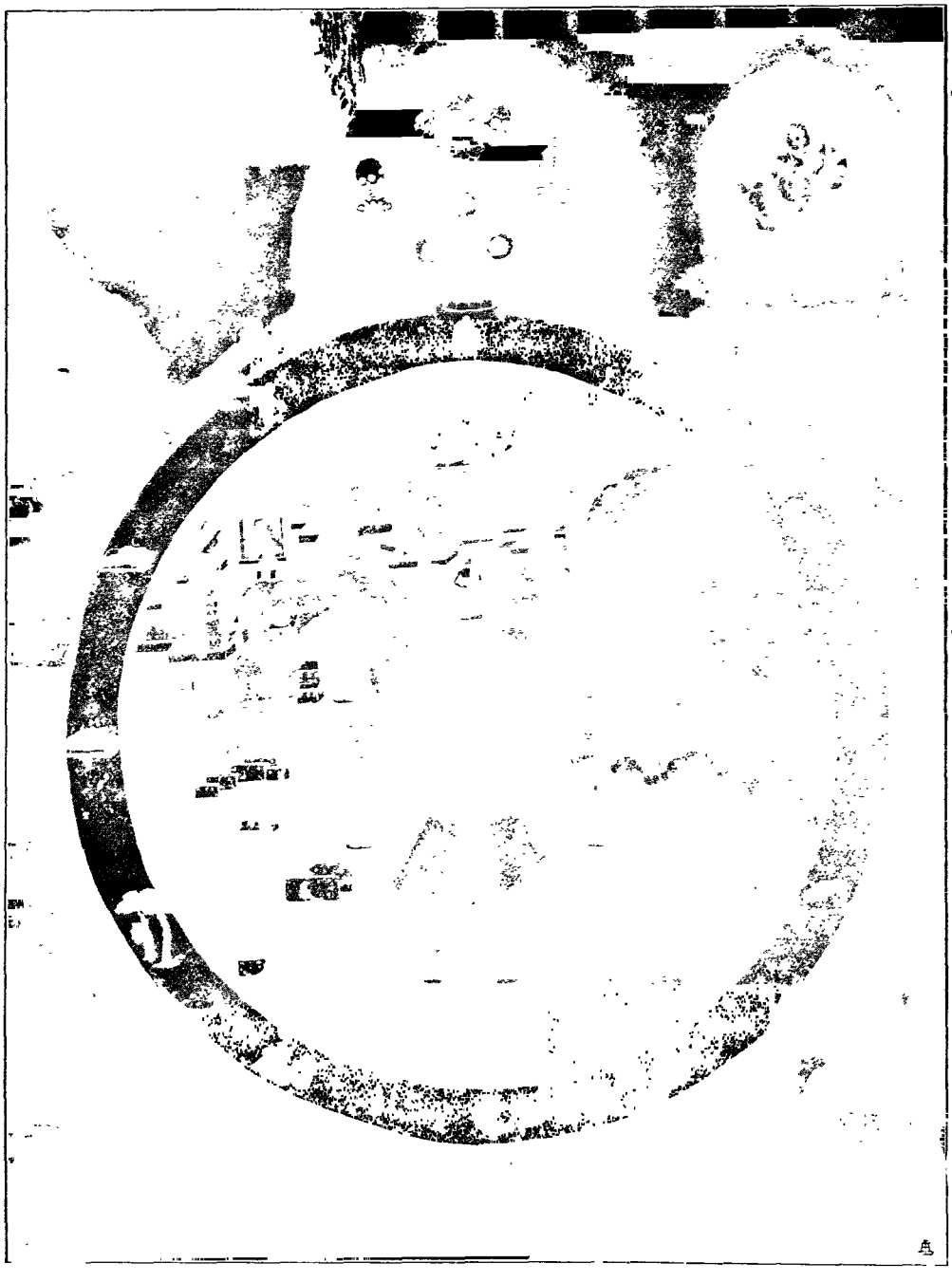
[3] Kushok Bakula died in 1919, after having secured the succession by incarnating himself in a Ladaki boy.

At Spituk there is nothing in particular to notice except perhaps a modern painting in the portico of the temple representing a great wheel of life. This is one of the most important symbols of Mahayana Buddhism: the several sectors of the circle represent

Kushok Bakula and the treasurer (*chagzot*) of the monastery of Spituk.

the different terrestrial and extra-terrestrial stages of existence, the extra-terrestrial being the paradises of the Lha and the places of torment, or infernos, the intervals, perhaps thousands of years long, between cycles of reincarnation on the earth. The outer circle

The monastery of Spituk.



Painting of the Wheel of Life in the monastery of Spituk.

contains twelve symbols, representing the senses and the delusions they give rise to. In the centre of the wheel are three animals, standing for the three worst capital sins: the pig for sloth, the dove for lust, the serpent for anger.[1]

The other *kushok* is an incarnation of Stagtsang Raspa,[2] a celebrated monk of the red sect, who came to Ladak during the reign of Sengge and founded the great monastery of Himis. *Kushok* Raspa had not the venerable aspect of his colleague Bakula; indeed, he seemed to stand for the mild rule and relaxed discipline of the red sect, by contrast with the austerities of the yellow, and its strict abstention from all sensual gratifications. And yet he too, before he could become a *kushok*, had to pass the hard test of 12 years of silence and contemplation, 12 years of complete isolation from every human contact. He had emerged from it not long before. A handsome man, of imposing height, in a tunic of fine crimson wool and a wide mantle of the same material lined with cherry-coloured silk. He had a chubby face, and wore gold-rimmed spectacles, which however did not detract from the vivacity of his expression. His manners were unaffected and cordial, and he seemed, after his long imprisonment, to be enjoying everything, like a boy just out of school.

He displayed the liveliest curiosity for all the latest novelties of Western civilization, and the monks who formed his escort bore one a telescope, another a pair of binoculars or an electric bell, besides the hat of ceremony, with the turned-up brim lined with fur, which was as useless as the other objects, as I never saw it on his head. Our operations furnished him with endless diversions of which he never tired during our whole stay. He was present when we launched our pilot balloons, making a show of following them with the telescope; he came of evenings to look at the stars through our instruments; he wanted everything explained, even the gravimetric and magnetic apparatus, and would listen with the most profound attention, though the subject-matter, abstruse in itself, had all to be translated into Tibetan by Dr. Peter, and could only have deepened for him the mystery of our performances.

The monastery of Himis is two long stages from Leh; and the *kushok* therefore

[1] There is an entire literature upon the symbolism of the wheel in Buddhism, and various theories to explain its derivation and meaning. See L. A. Waddell: *Buddha's Secret*, in the Journal of the Royal Asiatic Society, April, 1894; *Lhasa and its Mysteries*, p. 222; *The Buddhism of Tibet*, p. 102. Simpson, in his work on prayer-wheels and wheels as religious symbols, mentions the wheel of life only in an Appendix (*op. cit.*, pp. 270–1), repeating Waddell's explanation. A better description is given in the recently published *Introduction to Mahayana Buddhism*, by W. M. McGovern, London, 1922, pp. 153 *sqq.*

[2] Francke (*History of Western Tibet*, etc., p. 97) calls him Stagtsang Ras chen. But the present *kushok* of Himis calls himself and is called by everybody Stagtsang Raspa. Between 1038 and 1122 there actually lived in Tibet a celebrated monk, called Mila Raspa, author of many popular works and head of a sect (see Grünwedel, *op. cit.*, p. 6), who, according to Kawaguchi (*op. cit.*, p. 175) is to-day one of the most venerated saints in the hagiology, and also the only Tibetan poet. But there can be no relation between him and the abbot.

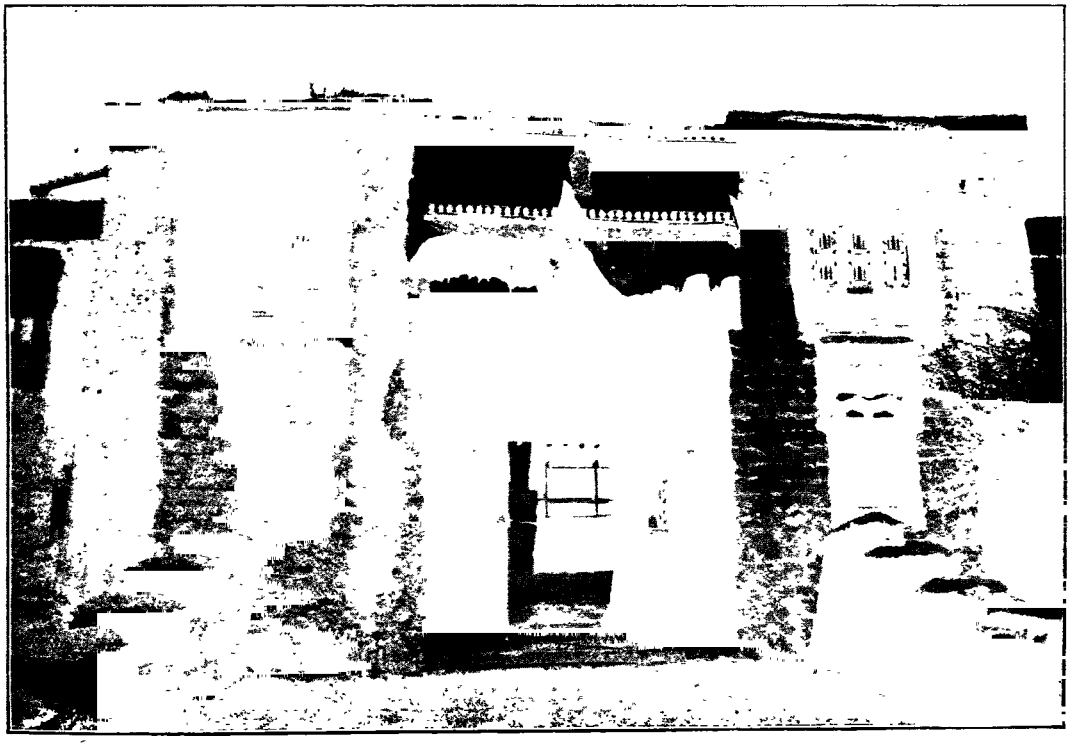
had a residence in the city. His reception room was very well furnished, quite luxurious by comparison with the King's, the floor carpeted, the walls and ceiling hung with tapestries and embroideries; against the walls were soft divans made of several thicknesses of felt, with little lacquered tables from Lhasa in front of them.

For the latter part of March and the whole of April the two *kushoks* were nearly always at Leh. Bakula lived near by, at Sankar, a modern monastery down in the valley,

The present King of Ladak, with *kushok* Raspa and his suite.

with pleasing architecture and fine mural paintings. We went thither, being invited together with *kushok* Raspa to a large popular celebration in the great court of the monastery; whether given by the abbot or by the population, I do not know. A few days later *kushok* Raspa returned the courtesy to the abbot of Spituk, with a similar entertainment and reception at Leh. Large tents were set up on one side of the court, the fronts raised to form a shelter for the abbots and their guests; a separate tent was for the King and the Prince. They and the *kushoks* saluted by bending very low and touching the tops of their foreheads; this being the ceremonial salute between equals. The entrance of the women dancers was most effective: arrived before the *kushoks* they all

knelt together in a row, then prostrated themselves to touch the ground three or four times with their foreheads. Everybody kept at a respectful distance from the incarnate ones, and on addressing them always covered the mouth with the hand or with the hem of a garment—a mark of great respect everywhere in the East. The entertainment consisted of the usual Ladaki dancing, and of archery contests, in which the King himself did not disdain to take part. While these were going on tea made in European fashion



Entrance to the monastery of Sankar.

was served to the guests, in cups of fine Chinese porcelain with saucer and lid of wrought and hammered silver.

These were, so to speak, the official entertainments; but indeed, at this season of the year,[1] the populace seemed in a continuous state of festivity; at any time of the day,

[1] Probably the festivals and ceremonies, which in Tibet are important for the number and for the general participation in them, occur also in Ladak. There is a complete list of them by Sarat Chandra Das (ed. Rockhill, *op. cit.*, pp. 261–5). Desideri also (Puini, p. 290; De Filippi, p. 206) describes the succession of calendar feasts of Lhasa; and there is an excellent account of the New Year celebrations at Lhasa by P. Cassiano Beligatti of Macerata (first half of the 18th century) in the account published by A. Magnaghi, *Rivista geogr. Ital.*, Vol. VIII, 1901, pp. 250 *sqq.*

and even into the night, one heard somewhere the sound of drums and music and lively voices; and there was a great drinking of *chang*, the beverage made of fermented barley, which is probably more intoxicating than our beer. Tea, which is now in universal use,[1] when prepared in the Tibetan manner with salt, butter and *satu* (flour made of roasted barley), is more properly a food than a drink. All classes seem to take part in the general rejoicing. I particularly recall a charming open-air festival for children of all ages from four to thirteen, which I chanced to see. A pretty tent was set up under the trees, with carpets on the ground and small Tibetan tables for the tea, sweets and dried fruit. In the meadow before the tent was the little mound with the target, and three young dancers in Chinese costume; in short, an exact reproduction of a grown-up entertainment. The children were alone, without supervision from their elders and hugely enjoying themselves. They welcomed me with the most perfect manners, invited me into the tent, offered me tea and sport with the bow, and would have one of the dances repeated for my benefit. Never, in the bazar or on the roads, did I meet a child or a boy who behaved rudely or awkwardly, never one who failed to greet you with the polite "ju-ju." No country yields itself with better grace than Ladak to the sometimes indiscreet curiosity of the traveller. An innate sense of courtesy is remarkably widespread among the people; it is without a shadow of hostility or suspicion of the foreigner.

I prefer not to go into the various racial stocks and anthropological types of the population of Ladak, merely referring to the anthropological and anthropogeographical volumes by Biasutti and Dainelli.[2] I will confine myself to speaking of a single class, the product of the peculiar geographical and economic conditions of Ladak. I mean the issue of a crossing between the Kashmiri and Turkestan merchants and the Ladaki women. These form a class by themselves, called Argon.[3] The word is in common use in eastern Turkestan, where it refers to a cross between Chinese and Turki. It is very, very old; even Marco Polo speaks of a people called Argon, in the south-eastern corner of Mongolia, who are a mingling of Buddhist and Mohammedan stocks.[4]

As there are various races and types, so there are also at Leh various religions: the

[1] The use of tea began to spread in Cunningham's time, about 1850 (*op. cit.*, p. 305). The preparation is rather complicated. The tea stalks, with their leaves, are boiled some time in water, and the infusion poured off into long wooden cylinders where it is churned, with the addition of salt, butter, a little *satu* (barley flour) and a salt of soda which precipitates the tannin and colouring matter. It is then poured into large teapots and kept hot over a brazier. It is of a light-chocolate colour, and not unpleasing to the taste. It is poured out into the little cup which every Tibetan or Ladaki always has with him; about half the quantity is drunk, into the rest they put a pinch of *satu* flour and work it into boluses, which they eat. There is a detailed description of the preparation of *chang* and tea in Desideri (ed. De Filippi, p. 181).

[2] *Relazioni scientifiche*, Serie II, Vols. VIII and IX.

[3] See Cunningham, *op. cit.*, p. 208, and Drew, *op. cit.*, p. 244.

[4] See Yule's *Marco Polo*, 2nd edition, Vol. I, p. 275.

Sunni and Shiah Mohammedans have three mosques, the Hindus a small temple, and there is besides the little evangelical chapel belonging to the Mission. They live harmoniously together, thanks to the tolerance and broadmindedness of the Ladaki lamaists, which is utterly devoid of sectarian prejudice, and the more remarkable in a people so universally devout and full of religious zeal.

Leh, the political and commercial capital of Ladak, is not very interesting as a religious centre, nor is it the goal of pilgrimages. Yet one may witness from time to time public displays of worship; for instance, one day in the bazar I saw a group who were about to make the circuit of the Namgyal Tsemo, the temple-crowned height behind the city, covering the whole distance by measuring the earth with their bodies (*koram*) in the following manner: the pilgrim, standing erect, carries his hands to his forehead, then lies down flat on the ground, stretching out his arms as far as possible beyond his head and making a mark in the dust with his finger. Then he takes his stand on the mark, repeats the process and so on. The result of several miles of this is scarred and bleeding hands, a swollen face, and eyes inflamed with dust and tears.[1]

We were present on April 13th at an official religious ceremony of some importance, the destruction of the *torma*, preceded by the reading of the *Kahgyur* in the temples of Leh, which takes a number of monks several days to accomplish. The *torma* is a rag doll and a bundle of twigs coated with butter with the intestine of a sheep twisted round it. In these objects are concentrated all the sins, the diseases, the ills due to malign influences, which are counteracted by the burning of the symbols. The sinister objects are carried in solemn procession by the monks of Phayang and Tikse, arrayed in ceremonial vestments, followed by sacred music. After a pause before the *tehsil* to pray for the prosperity of the Maharajah, the procession issues from the city to a near-by level place where tents have been set up for the authorities, the *kushok*, the King and the Prince. The garrison is also present, some twenty soldiers, with two little cannon for firing salutes. The soldiers—and any citizen who happens to own a gun—fire at a horn full of blood, an offering to the Tantric deities, which is hanging from a cord stretched between two poles; and also at the *torma*, which they end by demolishing with their swords. At one time the *torma* used to be burned, and it seems to have been the Englishman Johnson, formerly *wazir-i-wazarat* of Ladak, who introduced its destruction by firearms.[2]

On the rocky spur west of Leh, there is a cabin, near a tree and a little spring; there, for 18 years, a hermit had lived in utter solitude, a perfect reproduction of the

[1] Sven Hedin (*op. cit.*, Vol. I, p. 357 and Vol. II, p. 199) describes the *koram* in Tibet, where the pilgrims make long journeys in this way, protecting their hands with wooden gloves. See also Yule, *Cathay and the Way Thither*, Vol. II, p. 143.

[2] Giorgi gives a detailed description of this ceremony as performed at Lhasa, and of the solemn procession of lamas and monks, who "*bini procedunt pulsantes tympana, instantes buccinas, himnosque canentes*" (*op. cit.*, p. 212), where there is also a fine plate with a picture of the procession.

desert anchorites in the early years of the Christian era. He had the long flowing hair, braided from the nape of the neck; the ascetic face with its pure, refined features, the long robe of coarse woollen serge. Here among these crags, with that wild and desolate valley for a background, he seemed a vision out of the *Lives of the Saints*. The hermitage is a little building with a small verandah and two rooms, a shrine and a kitchen. A bundle of rags in a corner of the verandah showed his resting-place in the heat of

The hermit of Leh.

the day. Inside the chapel, which is adorned with the usual ornaments and *tankas*, is a little chest large enough to sit on; and there he squats with crossed legs in the ritual attitude. A cat with a bell round its neck is his sole companion. The faithful regularly bring him presents of food.

I went likewise one day with Rasul Galwan to see a *kurim*, a religious service in a private house, held before beginning the spring field work, to propitiate the gods and insure a plentiful harvest. The service took place at the house of the *ʒaildar* of Leh,

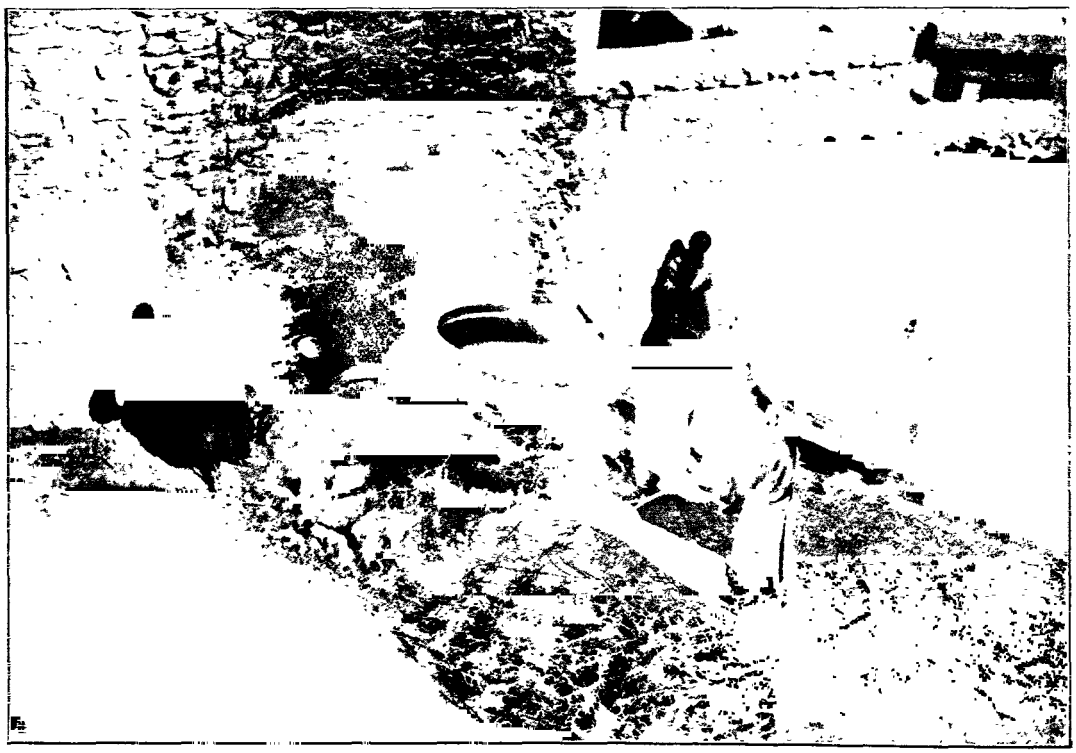
Kalong Lobzang Sewang, a rich landed proprietor who, together with the *lambardar* (mayor), exercised authority in the city and dealt with the officials of the government of Kashmir. The house was a three-storey one, among the fields on the outskirts of Leh, and it was flanked by two tall *chortens*, in memory of the father and grandfather of Lobzang. The foundations and the lower part of the walls were of stone, the upper storeys of large sun-dried clay bricks. On the ground floor were store-rooms with agricultural implements and the usual farming gear, and the kitchen, a large room with an enormous stove in the middle made of clay bricks, with the sides decorated with Greek key patterns and geometrical designs in relief, where a fire of dried dung was kept alight by a bellows made of a leather bag. On the walls were shelves and brackets for dishes and coppers. Uneven stone steps led up to the first storey, and other narrow wooden ones as steep as a ladder to the second storey and the terrace, upon which opened, as usual, the private chapel with a statue of Buddha and some minor gods, hidden by a veil or curtain. There were the usual vessels for the offerings and some sacred books and *tankas*.

The service was held in a room arranged for the purpose on the second floor. The centre of the space was occupied by a square dais about 8 inches high, upon which was erected a pyramidal structure with narrow steps. At the edge of the dais were rows of little bronze cups full of melted butter, with lighted wicks; and the pyramid was entirely covered with thousands of cones made of barley flour and butter. The centre cones, at the top of the pyramid, were coloured a bright red. Round this species of altar painted banners framed in silk were hung on cords suspended from the beams of the ceiling. In one corner was a carved and painted wooden shrine, with three niches holding statues of gods. Along two sides of the room stood twelve monks with prayer-wheels, the bell, the sceptre and the band, consisting of large trumpets, two smaller trumpets, cymbals, clarinets and two flat drums a yard in diameter. The monks sang short litanies in loud nasal voices, interspersed with a few beats of music. The din in the closed room was deafening, and reminded one of the uproar of a Roman *befana*. From time to time there was a brief silence, while the monks prayed and told their beads. Some guests, friends of the master of the house, stood holding little lighted sticks of incense. The whole celebration usually lasts several days. Two or three times a day the monks are served with buttered tea and *satu*, which they take in the same room.

The *ʒaildar* led me into the reception room on the first floor; it was very large with a mosaic pavement of small stones embedded in clay, partly carpeted with felt, and a low ceiling resting on wooden pillars. There was a narrow unglazed window with wooden shutters. The doors were of rough planks held together by a cross-piece in a groove without nails. There was no fire-place, but in the centre of the room was a square bronze brazier in the Chinese style, with burning charcoal. Low couches were disposed here and there; on one wall was a large painted portrait of the Dalai Lama,

with silver votive lamps before it, a prayer-wheel and silver vessels for holy water. Tea was served in the Ladaki fashion, and then I took my leave.

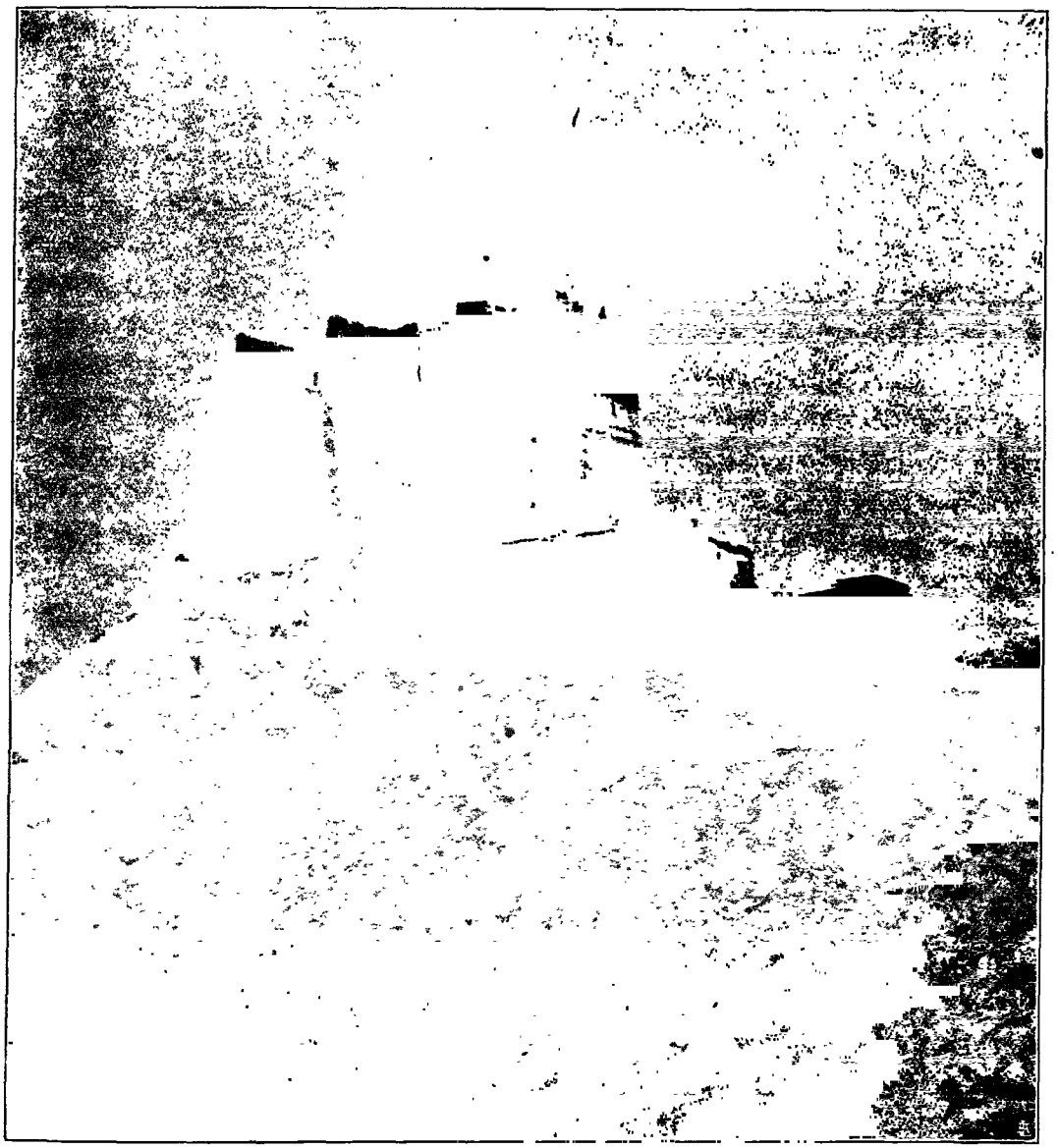
There is no monastery at Leh, but merely a number of temples served by monks from neighbouring monasteries. One day, when we were inspecting several temples near the royal castle, we saw monks from different religious houses grouped at the feet of a statue of Chenrezi (Avalokita), intent on reading the *Kahgyur* to propitiate the gods in favour of the Maharajah. In another temple containing a statue of the infant Chamba



Making tea for the celebrants.

(Maitreia) the lamas of Tikse were officiating, with songs and sacred music; and lastly, some monks of Himis were praying in a third temple, containing several statues of Buddha, one of them made of porcelain. In the courtyard a group of lay monks were standing about two large cauldrons of soup and tea, which little novices were serving to the monks in the temple.

I have mentioned that Leh lies at the foot of a rocky eminence, the Namgyal Tsemo or Peak of Victory, upon which stands a group of buildings. The largest and oldest of these are the ruins of the old royal palace of Leh, built about 1500. A little farther



The Namgyal Tsemo, with the ruined palace and the two temples.

down are two more squat, square structures which look like forts and are really temples. One, painted red on the outside, contains a statue of Maitreia seated in European fashion, [1] 20 feet or more high, and some mural paintings. Statue and paintings date from the reign

[1] See illustration p. 124.

Frescoes on the east wall of the lower chapel.

of Lde, about 1400. The second temple, which is windowless and dark, has its walls covered with paintings which are interesting from the fact that they represent two brothers of the Lha chen dynasty, who reigned together about 1400, Lde and Dragspa, dressed in Turkish garb, with great turbans, and their respective queens, in Ladaki costumes.[1] There are also in this temple the statues of four tutelary deities, covered with veils and scarves. There is a third chapel among the ruins of the castle on the top of the hill; it contains a statue of Avalokita and a *chorten*.

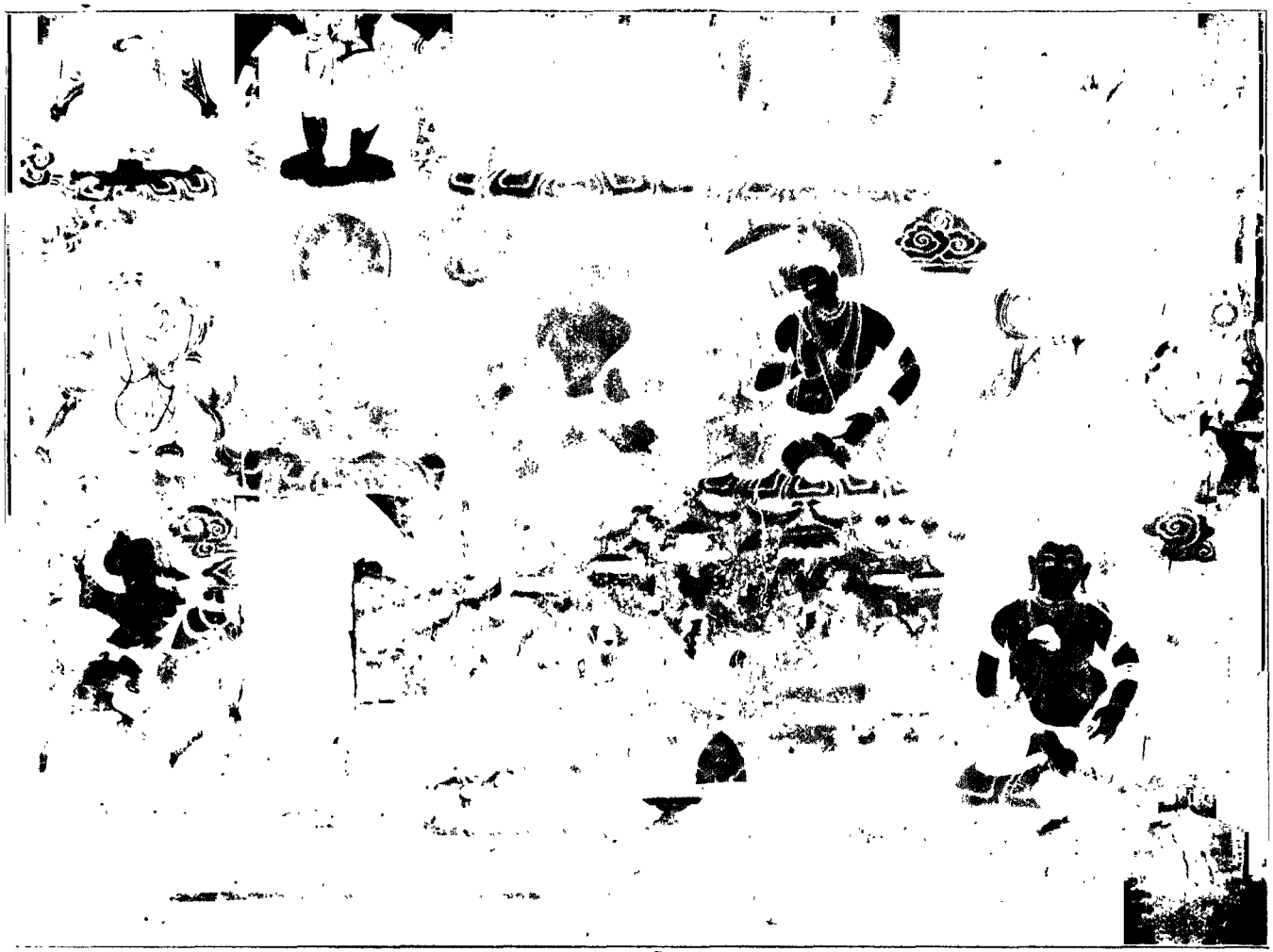
Behind the Namgyal Tsemo is the little suburb of Chubi, near a large *chorten* called Sgomang, a complex but pleasing structure—the largest *chorten* in the whole of Ladak.

In the environs of Chubi, on the nearest hill-side, are scattered a good many small furnaces for cremation. These are shaped like wells, round or square, with a hole at the base for inserting the wood. Cremation is general in Ladak; wood is scarce and dear, dry dung is used for both cooking and heating, and the people spend their small savings in accumulating piece by piece the wood which will be used to cremate them. Every family has its own furnace (*romkhang*, house of death) in which the deceased owners are cremated. The wealthier and better classes have their furnaces painted and decorated. The bodies of the lamas and of foreigners are burned in furnaces built for the purpose; often after the cremation of a lama who has been particularly venerated in life the furnace where he was burned is built into a *chorten*, the repository of cones and medallions made of the calcined and ground-up bones mixed with clay or plaster.[2]

After death a body lies in the house for several days, from 4 to 15 according to the rank and dignity of the family; while a larger or smaller number of monks say prayers and sing psalms beside it. I was present at the funeral services of the head of a family living near Leh. The house was modest in appearance; outside it some twenty friends and relatives were crouched in groups on the ground, both men and women, including a nun, and drinking tea and *chang*, with morsels of *satu*, handed round by the family. Beside them stood a square catafalque, covered with red stuff below and

[1] See Francke, *Antiquities of Western Tibet*, p. 77.

[2] On the Rupshu plateau, where there is not a morsel of wood, corpses are exposed on the hills to be devoured by vultures and stray dogs. In Tibet the dead are regularly fed to animals. There is a man whose trade it is to cut up the bodies; he quarters them and divides the flesh in pieces which he throws one by one, to the vultures if the corpse is of a religious, to the dogs if it is a common person. The bones are ground in a mortar with the blood and some flour, and the paste distributed in the same manner. Other corpses are thrown into the river to feed the fish. Only rarely and in the case of very rich or important persons does cremation take place. The bodies of the grand lamas of Lhasa and Shigatse are preserved whole with salt, and kept in large urns, in imposing mausoleums erected for the purpose. For the details and the significance of this singular practice, see *Desideri*, De Filippi ed., pp. 195 and 406, and the account by Orazio della Penna in Markham, *op. cit.*, p. 338; Sarat Chandra Das, *op. cit.*, pp. 163 and 252; Rockhill, *Land of the Lamas*, pp. 81 and 287; Sven Hedin, *op. cit.*, Vol. I, pp. 369 and 406. None of these, or other writers on Tibet, describe such furnaces as are used in Ladak.

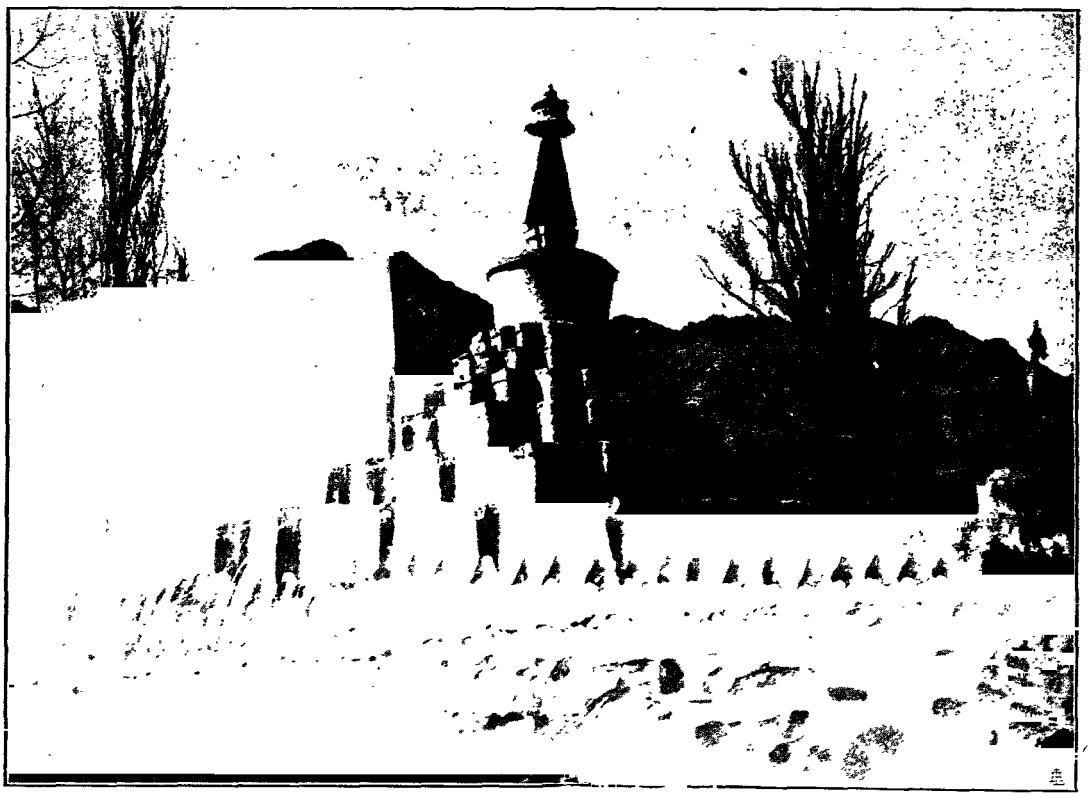


Frescoes on the south wall of the lower chapel. Below, the two Kings Lde and Dragspa in Mussulman costume and the Queens under parasols. (See also illustration on p. 126.)

Fresco in the royal palace on the Namgyal Tsemo.

decorated above with red, yellow and green cloth; the whole resting on a stretcher with two long wooden poles.

The sound of sacred music and the songs and prayers of the monks issued from the house. After nearly an hour men began to come out carrying wood, some lighted brands and the offerings: a dish with two sheeps' heads, two large cones of *satu* kneaded with butter, a plate with little cones of butter and grain, a vase of holy water, two small Tibetan tables. Then the monks came out carrying the trumpets, drums,



Sgomang *chorten* at Chubi near Leh.

cymbals, the bell, the sceptre and several prayer-wheels. They wore special vestments, like albs and stoles, and caps even more than usually fantastic in shape, and they walked backwards facing the corpse which issued after them: a shapeless bundle, bound tightly together with the legs folded up to the body, carried in a man's arms. On the threshold the burden was laid on the shoulders of a stooping woman, the widow, but did not weigh on her because it was supported by two or three men. The veils covering the bier were raised, a man took the bundle in his arms and deposited it within. Then the widow, sobbing bitterly, walked seven or eight times round the bier, supported by

two relatives. This was the one human and touching note in the scene. A dog tied to a tree barked and howled continually.

The procession moved off briskly for the country, in the grey, rainy air with the lamas at the head, followed by the bier borne on the shoulders of four men, and by the relatives, except the women, who went back into the house. The furnace was in a neighbouring small valley. A man entered it, and a canvas was spread out to cut off the view of the corpse from the bystanders while it was removed from the bier and laid in the furnace. Then the canvas was stretched over the opening and held in place by stones. Near by were set little tables with the sacred vessels and offerings; behind them squatted the monks, who sang while the relatives and friends who had escorted the procession walked round and round the furnace, praying and prostrating themselves. Then they all went away. There remained only the monks, a servant and two men who chopped the wood with a hatchet, looking at us distrustfully the while, though we had respectfully kept at a good distance.

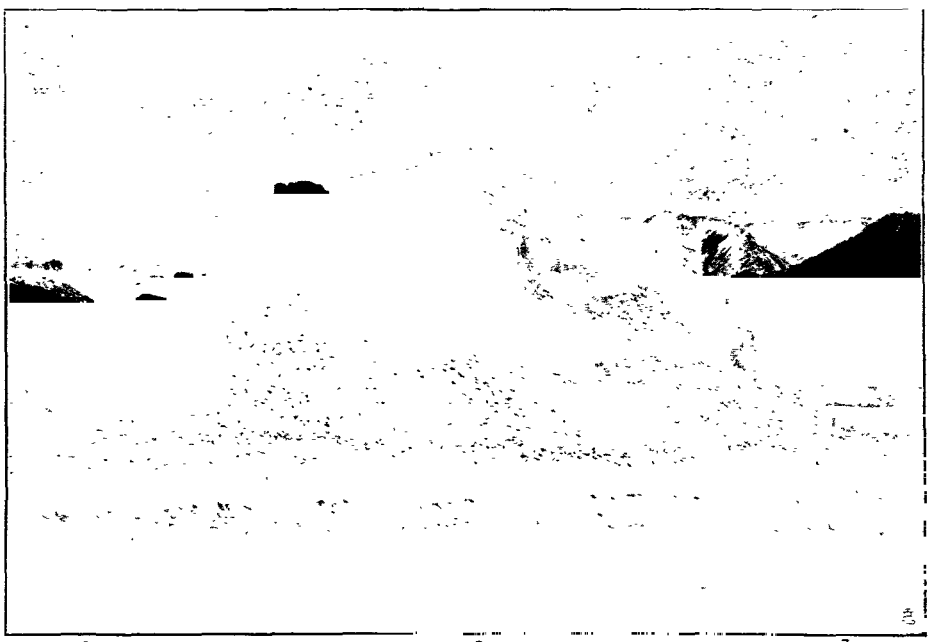
The monks went on singing psalms and ringing the bell, alternately with chords from the instruments. The wood was put into the furnace and kindled, the canvas was taken away from the top. One of the sheeps' heads was cut up, and the assistants put part of it in the bosom of their garments and threw the rest into the furnace. The monks took off their vestments and folded them, remaining seated as they did so; one of them, while continuing to ring the bell, took some bits of butter, some flour or grain from the offerings and put them on a plate which the servant went and threw into the furnace. The assistants went on cutting wood and feeding the fire for this gruesome cookery. A sickening odour issued from the furnace and hung in the heavy air. Two magpies surveyed the scene from a neighbouring rock, some crows wheeled about high above our heads; we could hear the wretched dog howling without pause, down at the house we had left. When we went away, at the end of an hour, the cremation was not yet finished.

A few more places in the environs of Leh deserve mention. In the cultivated fields above the city is a great heap of masonry that looks like a stone-pile and is actually the ruin of an ancient *chorten*, which must have been of colossal size. It goes by the name of Trashi Teu, and it contained 108 tabernacles when it was built, at the beginning of the 15th century, by the same King Lde who made the large statue of Maitreia on Namgyal Tsemo. Cunningham speaks of the tradition that this *chorten* contained a tooth of Buddha, afterwards carried off by the Balti Ali Sher when he invaded Ladak and made the king prisoner at the end of the 16th century.[1] The version given

[1] The tradition would rank this *chorten* with the most venerated of India; but it is not very probable, because there is in existence an exact historical list of all the supposed teeth of Buddha, which are venerated in various places. There are a good many of them, considering the advanced age at which he died—81 years. See the book of Marco Polo by Yule, 2nd edition, Vol. II, p. 311, and a monograph by J. Gerson Da Cunha: *Memoir on the History of the Tooth Relic of Ceylon*; London, 1875.

by Francke is more likely [1]: according to it the monument was put up to avert a great public calamity. The hypothesis is strengthened by certain excavations carried out by the missionaries of Leh, which revealed the existence of a Dard tomb containing several skeletons and earthenware vases close to the *chorten*; there are still other tombs as yet unexplored. It has been supposed that a plague broke out in the country and was attributed to the spirits of these deceased; and that the monument was accordingly erected to counteract their influence.

I should have liked to profit by our stay at Leh to investigate some of the



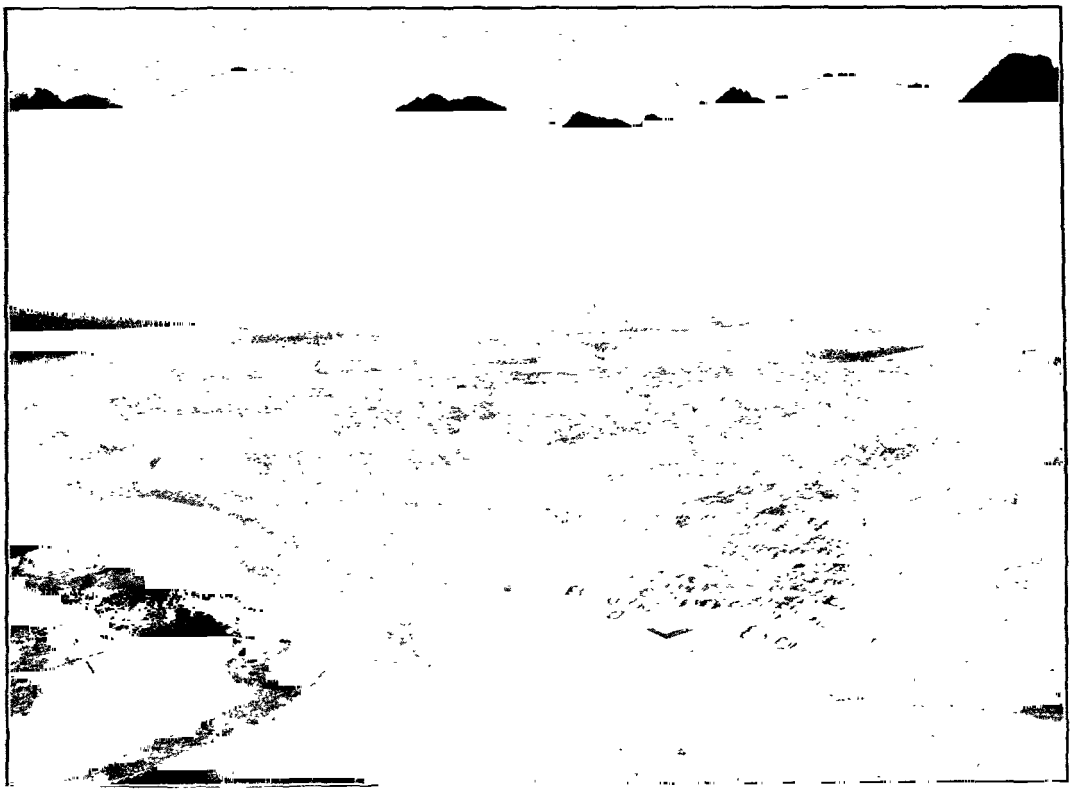
Trashi Teu *chorten*, near Leh.

still unopened tombs; but the permission I asked for was not granted, perhaps because the government of Kashmir did not wish to arouse superstitious fears, but more likely because about a year previously it had set up an archæological department of its own and did not encourage the researches of foreigners.

From the city gate at the end of the bazar two paths run down to the Indus. One leads to Spituk following the western side of the valley, the other skirts the base of the eastern spurs which are formed by stratified rocks. These rocks the Ladakis regard with suspicion, attributing to them a malign influence on the harvest; that is why along this side of the valley there is a continuous chain of *mani* walls, *chortens* and *lhatos*. As

[1] A. H. Francke, *History of Western Tibet*, p. 76; also *Antiquities of Indian Tibet*, p. 81.

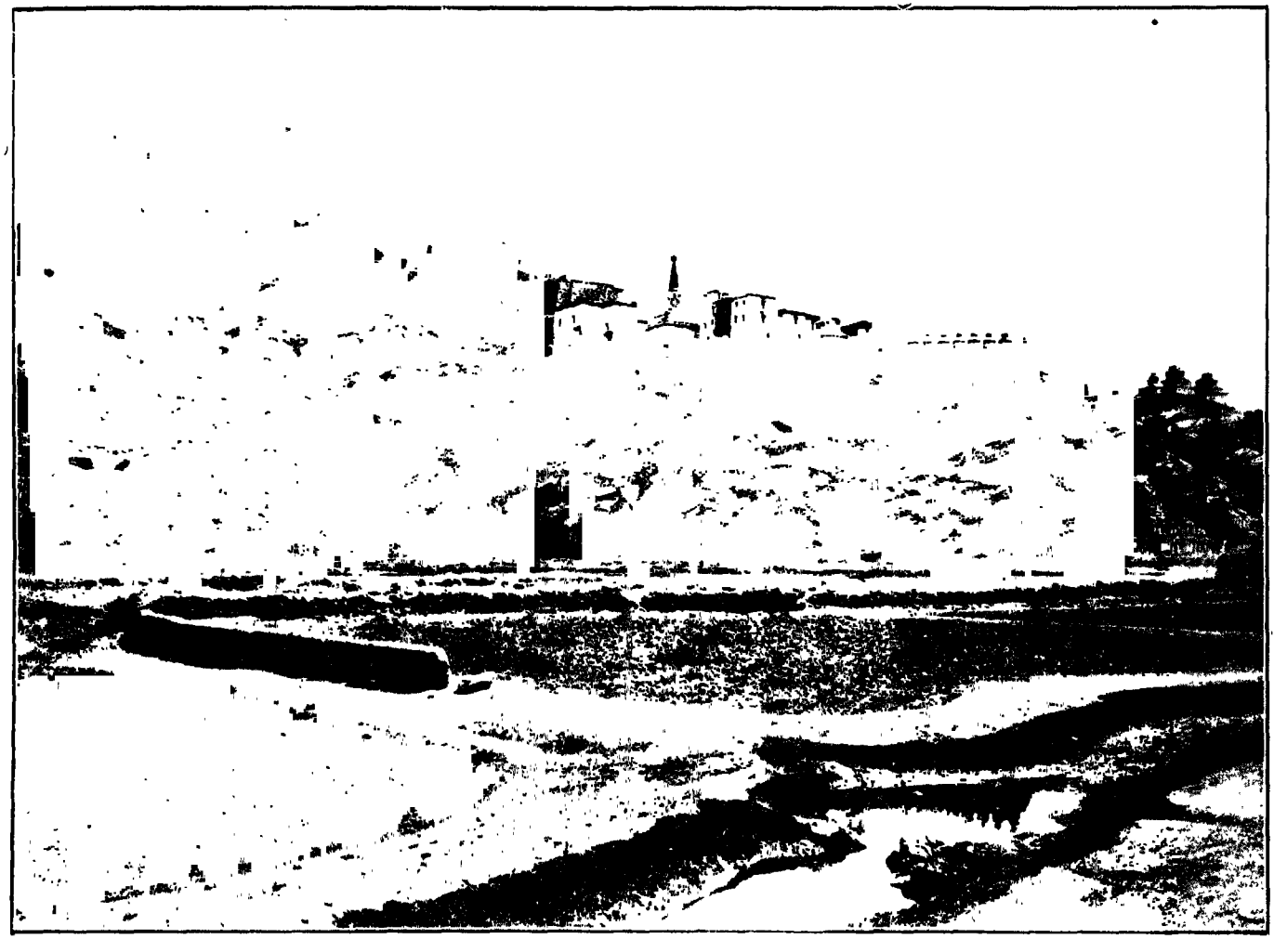
usual, monuments are more plentiful near the city; and a few hundred yards from the gate, in a sandy hollow surrounded by rocks, the Moslems also have their cemetery, with quantities of tombs all closely packed in together. They are all Sunni tombs, each with a longitudinal rib on top, like the back of a camel, a few built on platforms raised on steps of varying heights. The Shiah tombs are flat, without superstructure; I do not know whether the Shiahs have a burying-ground of their own at Leh.



Mussulman cemetery near Leh.

Beyond this the path rounds several spurs of the eastern side of the valley, skirting the longest *mani* wall in the whole of Ladak, built by Deldan, who succeeded Sengge, in the first half of the 17th century. It is over half a mile long, with a large *chorten* at each end. At the Indus the path forks: one branch crosses the river on a bridge and follows up the left bank, the other goes on up the right side. The valley is wide and level and there is a continuous chain of villages on both banks, among these more than one place of both present and historic interest.

An hour and a half above Leh, on the right bank, is Sheh, the seat of the elder dynasty



The castle ruins and the monastery, Sheh.

which preceded the Tibetan (1000–1400). The still impressive ruins of the ancient royal castle, the great fortified wall and the towers that guarded it cover the top of a rocky spur; on the ridge below is the *gonpa*, famous for a colossal statue of Chamba (Maitreia) which dates from the beginning of the 17th century (in the reign of Deldan). The statue is of good workmanship, made of masonry, and covered with gilded copper; it is said to be the work of a Nepalese craftsman. The seated figure of the Buddha is about 35 feet high, cut across by the floor joists of the upper storey. The richly and intricately decorated cult objects are set out on the floor of the upper storey, which comes about to the breast of the statue: among them is a large cup or basin of a size to hold enough butter to keep a wick lighted for a year. Above the Buddha's head is a canopy of embroidered silk, adorned with a row of little *tankas*. The walls are painted. The lower room is dark; it contains the lower part and the base of the statue, and the volumes of the *Kahgyur*.

At the foot of the slope, below the castle, is a monumental *chorten*, with a base and cupola of original and novel shape, which is of the same date as the statue. From the opposite side of the spur there once extended to its feet a lake, now reduced to a half dried-up marsh, in the little pool of which the castle, the *gonpa* and the *chortens* mirror themselves; and probably owe their name precisely to this circumstance, for *Sheh* actually does mean mirror.

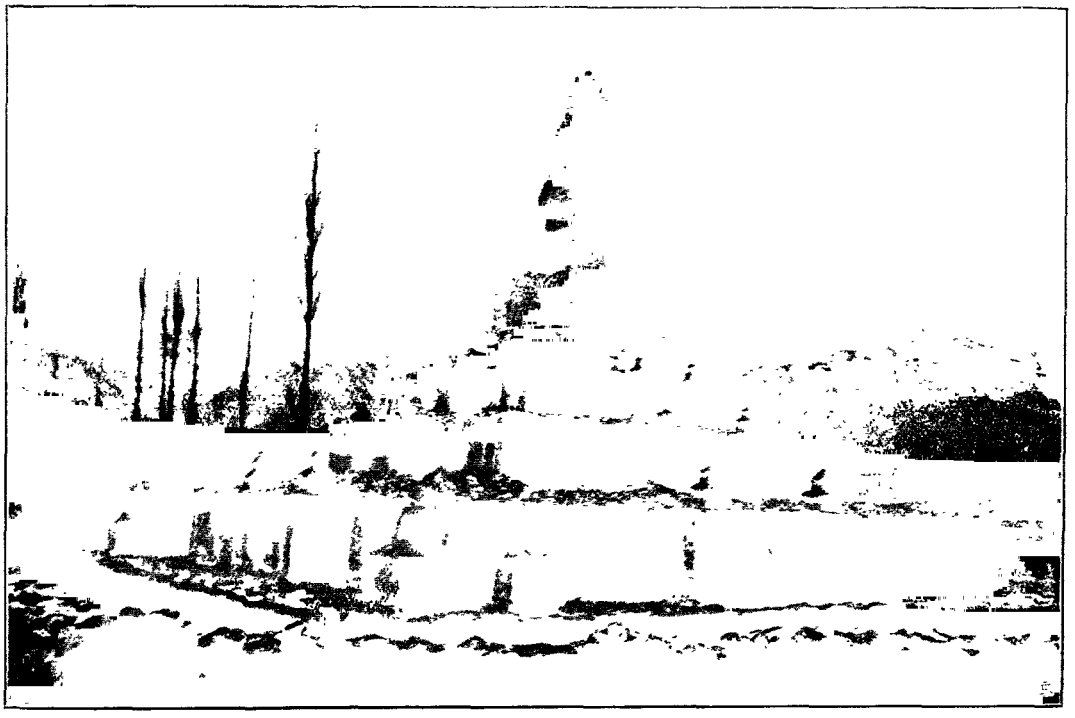
A little above Sheh is the much larger monastery of Tikse, likewise built on the crest and slope of a rocky spur. It has a large assembly hall and a temple with a row of statues, like a lamaist pantheon, ranged alongside the image of Dugskar, with the usual radiating arms and pyramid of heads.[1] On a long bench in front of it are the beautiful bronze and copper vessels for the offerings. The outside of the temple is adorned with a great many galleries and covered balconies. There is a fine large library. The great monastery had in it hardly 30 monks all told, of the yellow sect. They were expecting the arrival of an incarnated abbot from Lhasa, and were preparing his private chapel and lodgings in one of the best houses at the top of the hill.[2]

[1] See illustration, p. 107.

[2] The *kushok* arrived at Tikse a few months later; but he did not prove a blessing to the monastery. He was a boy of 18, much more given to diversion than to prayers and meditation. He seems to have led a scandalous life, smoking and drinking beer, and spending all his time in dancing and profane music, so that his monks revolted. The intervention of Bakula, *kushok* of Spituk, and of the king, did not mend matters. The young abbot, who seemed possessed of a devil instead of a saint, had his own monks flogged, sold the articles of the cult, took a Dard woman to live with him, and persecuted the peasants with fines and beatings, even beguiling their women, to whom he gave presents of turquoise and coral taken from the idols in the temples. The monks deserted the monastery. Finally the *waẓir* interposed his authority and forbade the *kushok* to remain at Leh. Scarcely three months after his arrival he left for Kashmir and India. Later he returned to Leh, having abandoned his habit, and went to live in the house of a Mussulman. It is a curious case of dereliction which appears to be rare in Lamaism, for I have seen nothing like it mentioned in literature. Heber (*op. cit.*, p. 230 *sqq.*) recounts the later history of the Tikse *kushok*. Apparently he had leanings toward Christianity rather than Islam.

Statue of Chamba (Maitreia) and sacred vessels, in the temple, Sheh.

Going on up the right bank of the Indus some 12 miles beyond Tikse you reach the mouth of the tributary valley Chimre, at the top of which is the pass called the Chang-la. In this valley, 4 or 5 miles from the Indus, are the village and the monastery from which it takes its name. Chimre is one of a group of lamaseries of the red sect founded by the first Stagtsang Raspa, who came to Ladak in the time of King Sengge (1590–1620); it is a daughter house of Himis. It too is a large monastery, built on a height, with buildings erected at various epochs. From the courtyard where the masked dances

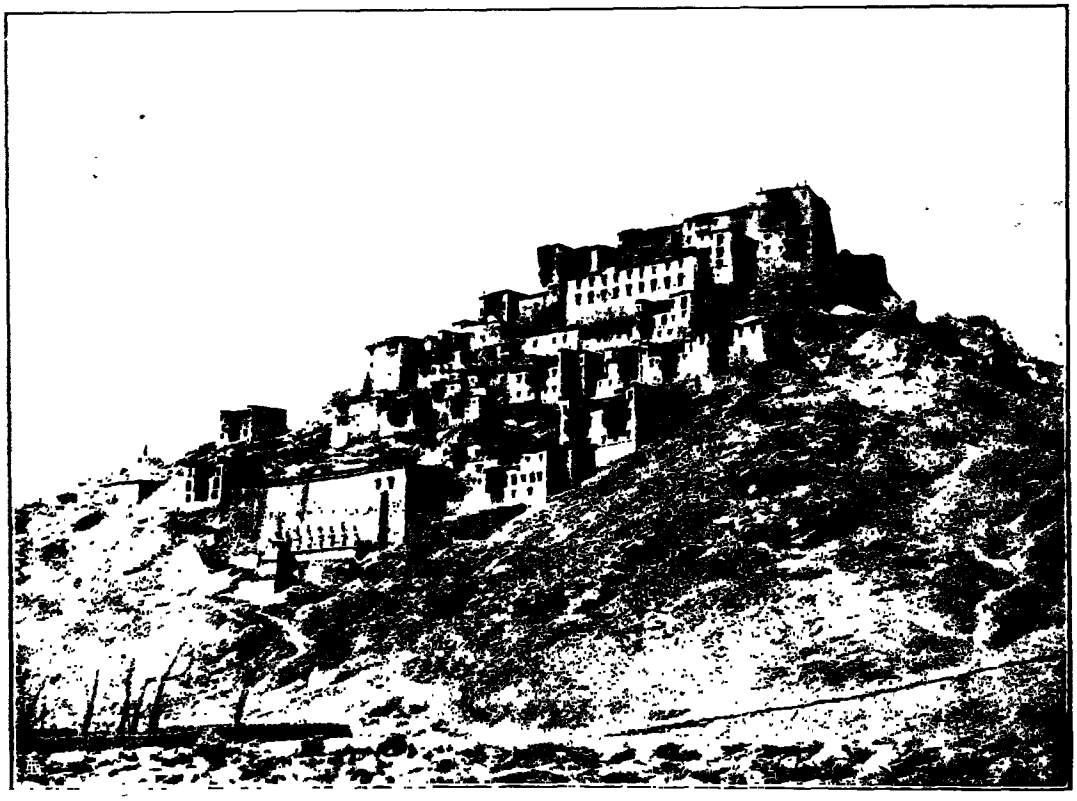


Chorten at Sheh.

are given one passes into a large temple with a throne for the *kushok*. On the farther wall are statues of tantric deities and paintings of large mystic circles, the sectors filled with a geometrical arrangement of divinities. When we entered the monks were saying the office, wearing yellow mantles with red stripes and great red caps on their heads. There are minor temples with other idols and deified lamas and valuable frescoes. Several *chumos* are attached as servants to the monastery, though there are barely 30 monks in all.

Very nearly opposite the mouth of the Chimre valley, on the other bank of the Indus, opens the little gorge within which lies the monastery of Himis, the largest in

Ladak. Just beyond the entrance to this small valley, in a little grove of poplar-trees, is a terrace on which is ranged a picturesque group of *chortens*. Farther on, a small village, where the roofs of the houses are covered with bunches of twigs from which flutter multi-coloured rags; then the monastery, built on the incline at the foot of the precipitous wall of the little valley: a perfect cascade of houses one above another, the lower ranges hidden by rows of poplar and willow trees. The monastery clings



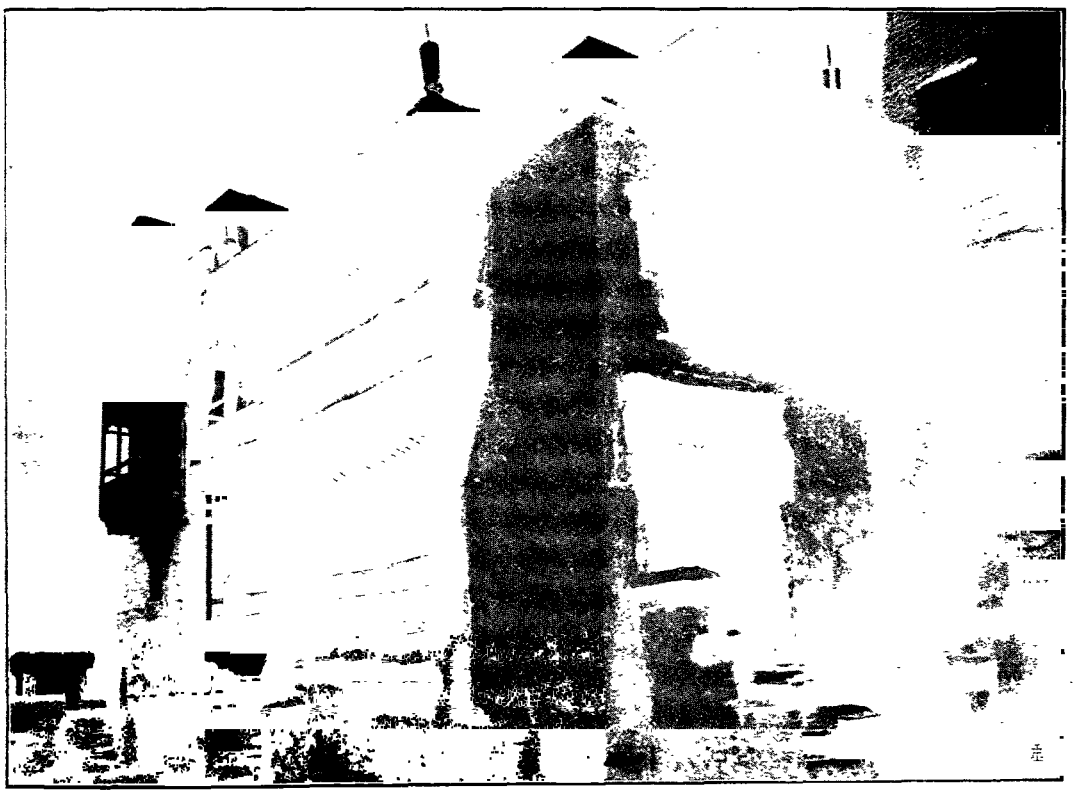
The monastery of Tikse.

to the mountain wall, almost becoming part of it, so that it does not look so large as it really is, nor has it the picturesqueness of those which rise on the summit of a hill. I have already said that it was founded between the 16th and 17th centuries by the red Lama Stagtsang Raspa, incarnate in the present *kushok*.[1] It can hold 800 monks.

[1] E. von Schlagintweit found in Himis an inscription carved on stone, recording the building of the monastery, begun by Sengge Namgyal Gyalpo in 1644 and finished in 1664 (*Buddhism in Tibet*, London, 1863, pp. 183 sqq.) According to Francke, Sengge reigned about 1590–1620 and was

In the time of Cunningham there were 160.[1] A hundred yards from the monastery is a nunnery, with accommodation for 100 *chumos*; but they too are greatly reduced in numbers.

Himis is famous for its sacred plays, which take place every summer, with great magnificence of scenery and costume, to celebrate the anniversary of the birth of Padma

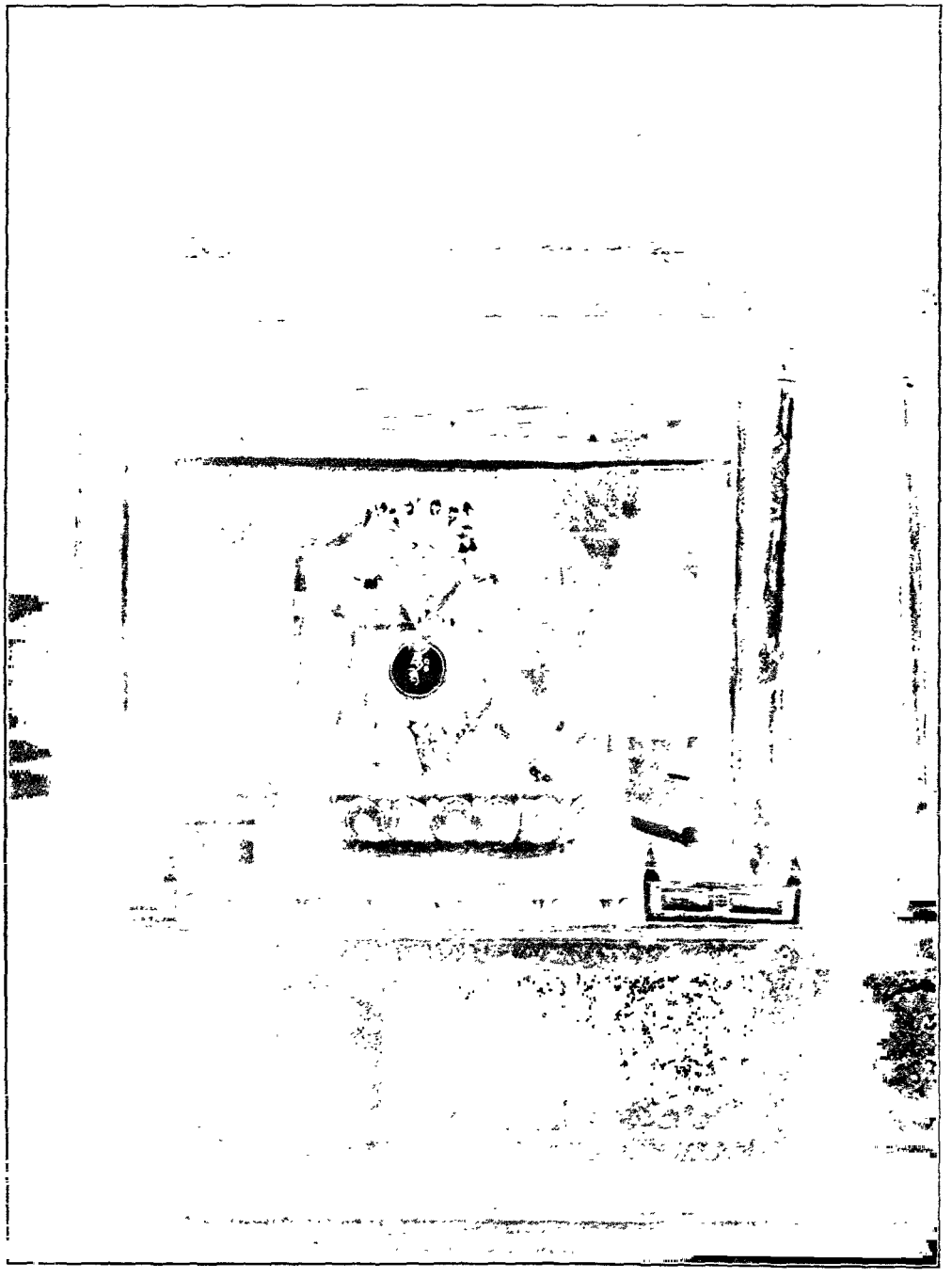


Loggias and balconies of the principal temple, Tikse.

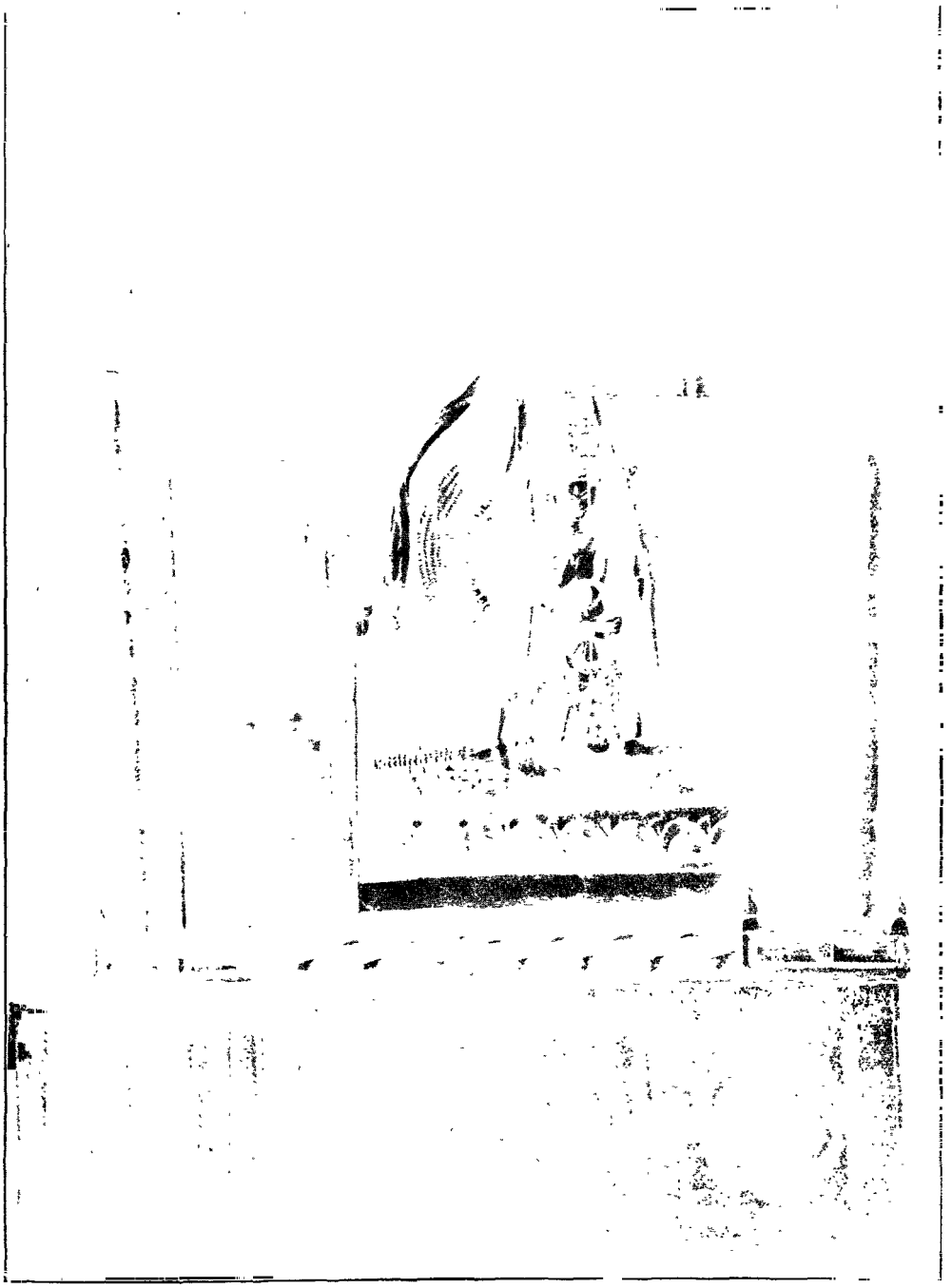
Sambhava, the father of Tibetan Lamaism. Hosts of people come from all over Ladak, and many monks and lamas even from Tibet.

succeeded by Deldan, about 1620–40 (see *History of Western Tibet*, pp. 96 and 101). Roero Di Cortanze (*op. cit.*, Vol. II, p. 7) says that the present monastery was built $3\frac{1}{2}$ centuries ago to replace an older one which was almost entirely destroyed by a landslide, the ruins of which still stand half a mile farther up the valley. T. E. Gordon (*The Roof of the World*; Edinburgh, 1876, p. 2) gives a picture of the monastery as he found it in 1873. It is not recognizable as the one standing to-day; but I must add that the drawing of the mountains does not correspond to reality either.

[1] Cunningham, *op. cit.*, p. 259.

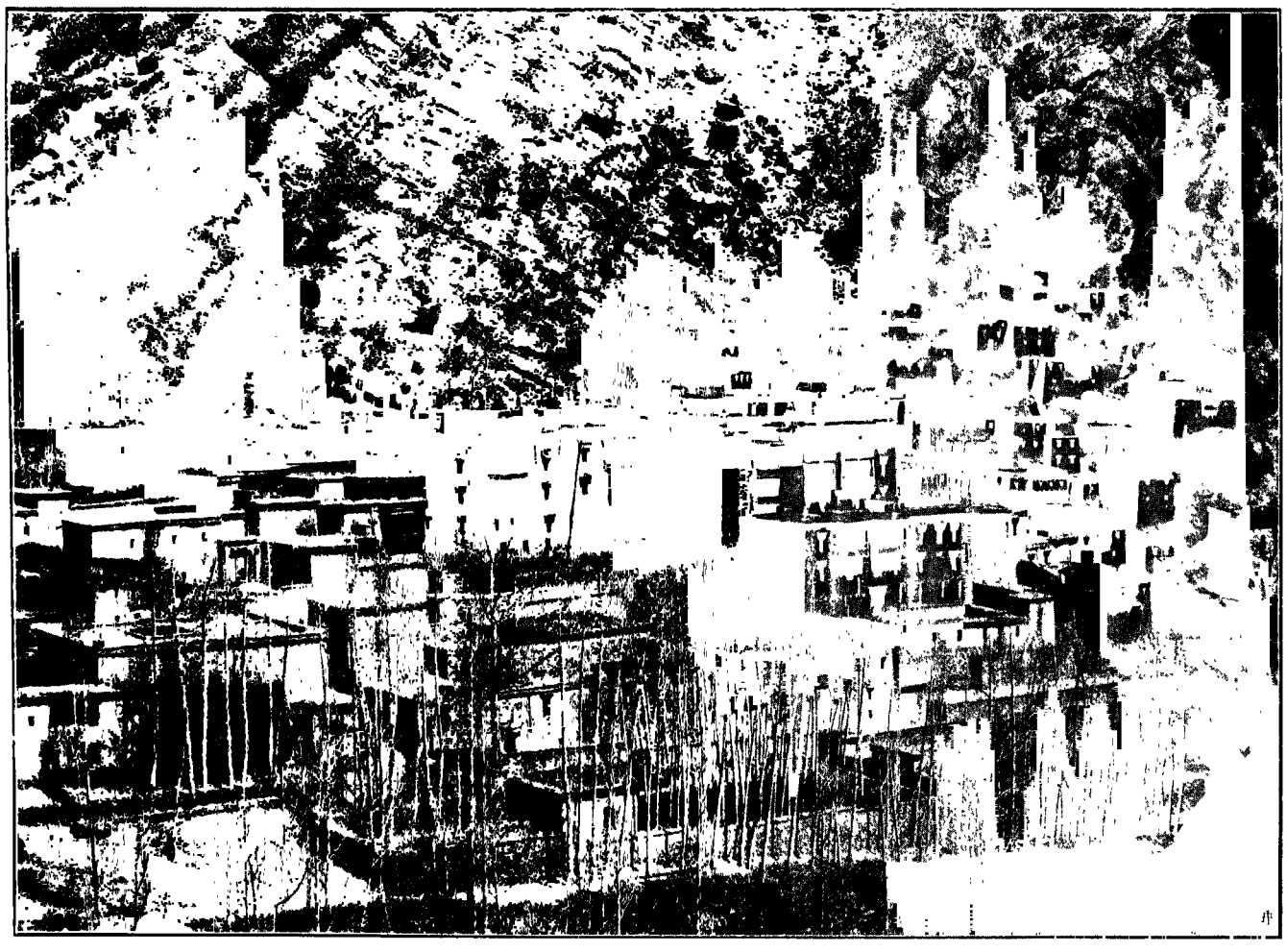


The *kushok's* private chapel, in the monastery of Tikse.



In the *kushok's* private chapel.

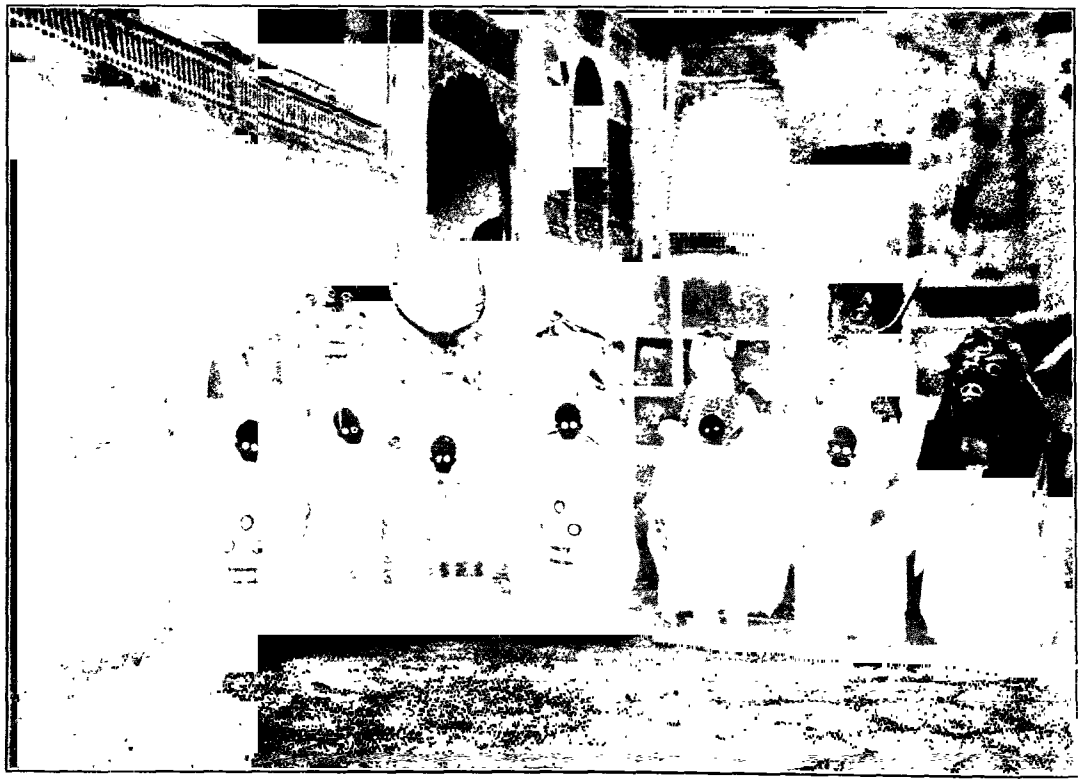
The monastery of Chimre.



The monastery of Himis.

Himis has large revenues from its broad estates; and it is the only *gonpa* in all Ladak which saved its treasures from the depredations of the Dogra Sikh armies, by siding with the invaders and supplying them with food.

The interior of the monastery is the usual labyrinth of corridors and alleys connected by all sorts of stairways in stone and wood, of trap-doors and passages, with a bee-hive of dark, disorderly and dirty chambers. There is a huge kitchen, with saucepans fit to serve the hundreds of monks who attend at the celebrations.



Costume and masks in the mystery plays.

There are three principal temples, large and magnificent, adorned by many statues, the most in evidence being those of the protectors of the faith, the monstrous tantric divinities.[1] The founder Stagtsang Raspa is portrayed in a statue half as large again as life, plated with silver gilded in parts. It is in the ritual position of the Buddha, and holds in its hands a vase set with precious stones with the sacred jewel on top. On the head is a curious hat shaped like a solar helmet, from which a veil hangs down cover-

[1] See illustrations, pp. 109 and 110.

Statue of Stagtsang Raspa, founder of the monastery of Himis (red sect).

ing the shoulders and back, leaving bare the face and breast. Round the neck hangs a necklace of crystal disks. The right arm is bare, the left covered with cloth. On the right of this figure is the statue of a venerated old lama who lived at Himis. In front of the images are cups full of butter.

In the largest temple should be mentioned a *chorten* some 20 feet high, entirely covered with thick silver plates, ornamented with bronze bas-reliefs and studded with stones. At the top is a little niche richly ornamented and encrusted with jewels.

One of the temples, perhaps the oldest, is entirely dark, and has the walls completely covered with frescoes, like others we had seen—at Namgyal Tsemo and Tikse. The paintings represent lives of saints and various deities. Many of the cult objects, the *tankas*, the vases for holy water and for the offerings, the musical instruments, are articles of great artistic value.

The reception hall is perhaps the most beautiful room in the monastery. The upper half of the walls is covered with wood richly carved and lacquered in colours, with many niches containing statuettes of various genealogies of Buddhas. The wooden pillars which support the ceiling have Chinese dragons carved in low relief and lacquered in colours.

In the treasury are kept the ritual objects used in the solemn functions and processions, and the properties for the sacred plays, a large quantity of costumes of every kind, with rich stuffs and brocades and masks, and such a variety of equipment as the green-rooms of even a large opera-house can scarcely boast.

There are also two libraries, one for the *Tangyur*, the other for the *Kahgyur*.[1]

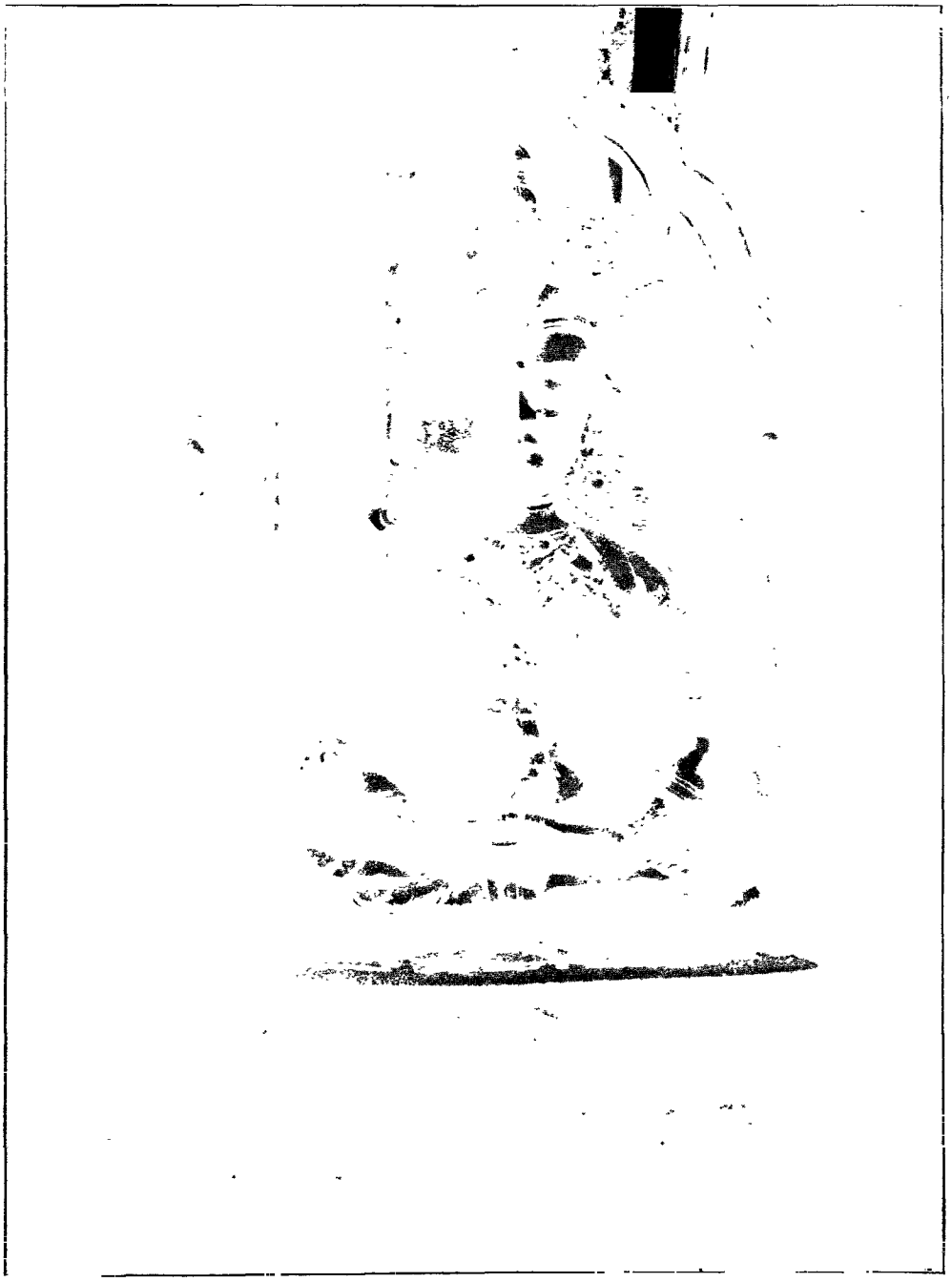
The monastery is guarded by large mastiffs chained in the courtyard, who receive the visitor with furious barkings.

A fine road built by the *kushok* goes on up the valley, then takes to the rocks for perhaps 2 miles, leading finally to a desolate spot where the hermitage stands in which he spent 12 years of solitary meditation, remote from mankind.

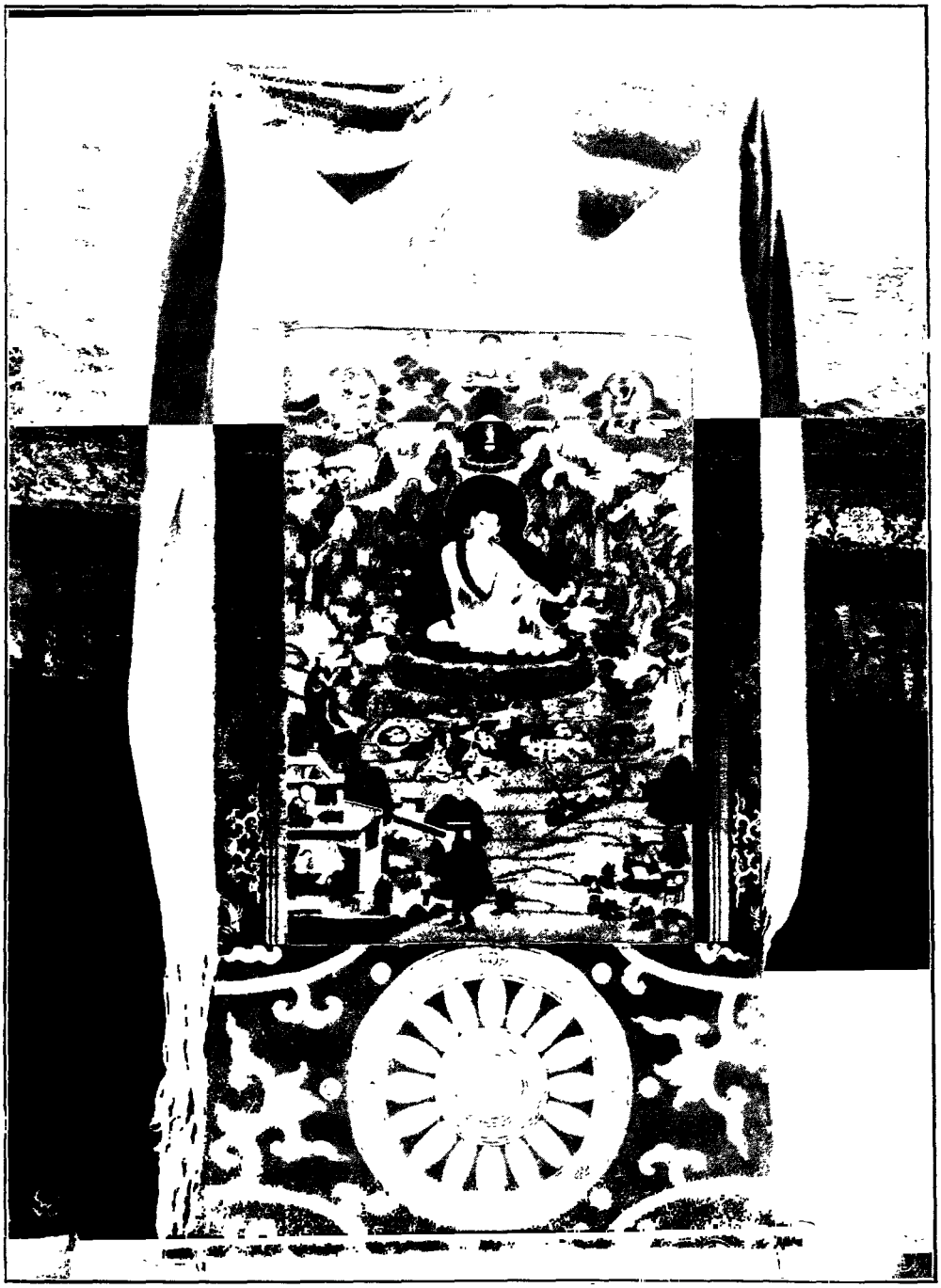
Before leaving Himis, I should perhaps devote a few words to the supposed discovery made there by the Russian Nicholas Notovich, to whom I have already referred.[2] Notovich went to Ladak in 1887. He says that a monk from the *gonpa* of Mulbek first revealed to him the existence at Lhasa, and in the principal monasteries, of manuscripts from India and Nepal, which refer to the prophet Issa (Jesus) who was considered to be an incarnation of Buddha. When Notovich went to Himis to see the mystery plays,

[1] In the first volume of this copy of the *Kahgyur*, on the frontispiece, there has been stuck by way of ornament and border to the text a paper decorated with gold leaf, with this inscription in the margin: Cum . privilegio . sac : Caes : Mat : Georg : Christoph : Stov : exc : Aug : Vin : *Cum privilegio Sacrae Cesareae Majestatis Georgius Christophorus Stov. excudit Augustae Vindelicorum*—that is to say, in the modern Augsburg. The provenance of the paper is unexplained. According to the *kushok*, this copy of the *Kahgyur* dates from about 186 years ago.

[2] N. Notovich, *La vie inconnue de Jésus-Christ*. See Chapter 11, p. 20.

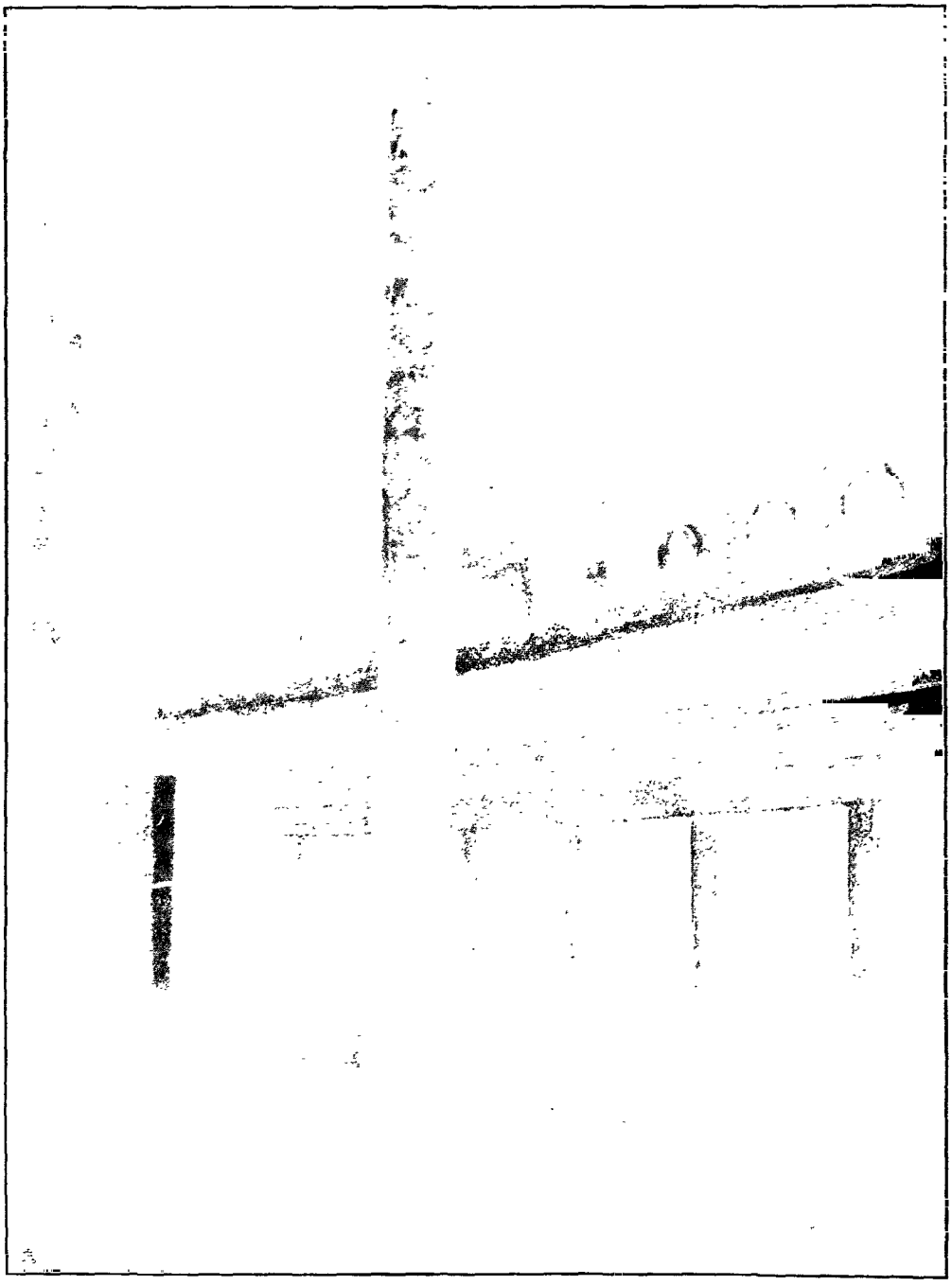


Statue of Tsepagmed, in the large temple, Himis.



Tanka in the *kushok's* apartments. (See illustration on p. 128.)

Frescoes in one of the temples, Himis.



Reception hall, Himis.

The *chagʒot* (treasurer) of Himis.

the abbot, " a venerable lama, whose eyes shone with intelligence," after a long comparative exposition of theosophy and Buddhism, in which he quoted Egyptians, Assyrians and Israelites like a Western scholar, did confirm to him the existence of a copy of the manuscripts in question in the library of the monastery. But all that erudition must have gone to the lama's head, for among other things he told the author that Himis was a monastery of the yellow sect.[1]

A few days later Notovich broke his leg at Spituk by a fall from his horse and then and there decided to be taken back to Himis—" a good half-day of easy going." It is at least 25 miles from Spituk to Himis and usually takes two days.

At Himis Notovich contrived himself a splint for the fracture, which actually enabled him to set out on the third day for Kashmir, where he arrived in three weeks. He admits that he made most of the journey in a litter ; a conveyance most unsuitable for the kind of road which he himself describes earlier in the book. In the two days at the monastery the venerable lama yielded to his solicitations and brought him the biography of Issa, " in two bound volumes whose large paper pages were yellow with age."[2] The lama read, an interpreter translated and Notovich wrote down in his notebook. For several years he made no use of his discovery. Only in 1893, after " spending sleepless nights co-ordinating the material and making a consecutive narrative of the verses " (?) [3] he decided to publish the wondrous tale.

Briefly told, the account refers to the presence of Jesus in India between boyhood and maturity—from his 14th to his 29th year. He became versed in the ethical and religious philosophy of Buddha and began to preach against Vedism. He learnt Pali and Sanscrit, studied the "sacred rolls" of the Sutra for six years, and then returned to Palestine by way of Persia. The chronicle, which relates the whole story of the life of Christ, including a new version of the Passion, purports to have been based on depositions of contemporary witnesses, edited by Brahmin, or Buddhist, Indian historians and translated into Pali three or four years after the death of Christ.

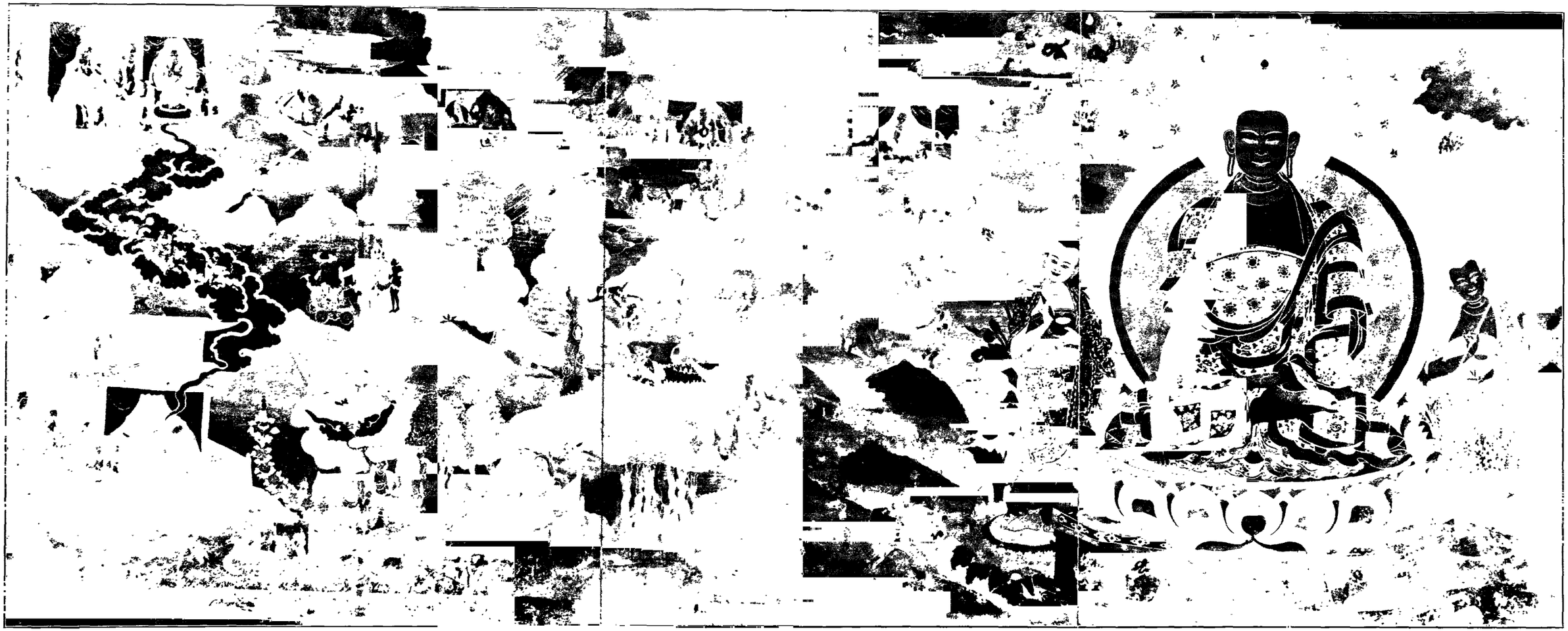
Kushok Raspa told me that in 1887 there was no head lama at Himis ; the monastery was directed by the old *chagzot* (treasurer) Ngagwand Choszang. The *kushok* also denied most positively and in writing that there existed in Himis any Tibetan manuscript books regarding Jesus Christ or referring to him in any way.

I should add in justification of this digression that Notovich's book, which reached its ninth edition in 1900, has not been called in question by any traveller. Much more might be said ; but this much, together with the comments in Chapter II, will probably

[1] p. 154.

[2] "*Deux gros livres cartonnés*" (p. 155). Elsewhere in his book he calls them " rolls of parchment." Both descriptions, irreconcilable in themselves, are unlike anything in Tibetan or Indian palæography. In this particular case, according to Notovich, the work in question was a translation into Tibetan of Pali manuscripts which had reached Lhasa from India.

[3] p. 167.



WALL PAINTING IN ONE OF THE TEMPLES OF HIMIS MONASTERY

suffice to give a measure of the credibility of the main argument. Apart from such material errors as crossing the Indus at Rawal Pindi, and the Himalayan range between India and Kashmir, the book bristles with improbabilities, and has all the ear-marks of a hoax, which certainly did not deserve the honour of being discussed by a savant like Max Müller (whom Notovich calls Muller), nor, on the other hand, the persecution by the Russian synod and the exile which did in fact befall the author.[1]

Dainelli was the only one of us who went up the Indus valley beyond Himis, as he will relate in the next chapter. All I need do is to conclude these notes on Ladak and Leh with a few general remarks.

The climate of Leh is probably drier even than that of Skardu.[2] From early in March to the middle of May there were at most a few scanty snowfalls in the valley, always at night, of which all trace had disappeared early in the morning. On the other hand, it snowed on the mountains with relative frequency. The sky was nearly always veiled by thin mist, and this lack of transparence in the atmosphere greatly hindered our measurements of solar radiation.[3]

After March the temperature gradually increased, and the snow-line receded little by little. By the middle of April there was a decided feeling of spring in the air, and work was begun in the fields, the ploughing, the carting of soil and manure. The women took as active a part as the men in these labours, chanting long dirges or brief rhythmical refrains.

The time of year was scarcely favourable to a judgment of the crops, but from what I had seen in the autumn of 1909 I gathered that the agricultural methods are most primitive. Among the ripe grain a thick growth of weeds was flourishing in the water that had not been turned off. The peasants seemed lazy and without initiative, trusting to the *mani* walls and the *chortens* for the success of the harvest. The grain is threshed

[1] The legends of the sojourn of Jesus Christ are referred to by Nicholas Roerich in his *Altai Himalaya* (New York, 1929); he professes to have heard them in Ladak. He reports them rather vaguely, giving no definite particulars as to where or from whom he collected them. We may perhaps find in them a distant echo of the stories related by early missionaries to Leh—de Azevedo in 1631, for instance, and Desideri in 1715.

[2] According to Henry Strachey (*op. cit.*, p. 67), it might almost be said that it never rains in Ladak. Snow falls not in flakes but in minute granules, with no appearance of crystallization, and as a rule only at night, between midnight and sunrise. Dew, hoar frost and hail are unknown. And as in all the region north of the western Himalayas, there are no perceptible electric disturbances, no thunder or lightning. See also on this point my *Karakoram*, pp. 315–16.

[3] Others before us had their observations impeded from the same cause. G. T. Walker, the Director of the Indian Meteorological Office, told us about a series of measurements of solar radiation carried out at Leh with the Balfour Stewart actinometer over a period of two years, 1884–85. The observations were often interrupted by cloud, so much so that in certain months it was not possible to get a series of observations for a single entire day; and moreover, even when there was no cloud, the light veil which usually gave the sky its pallid look would certainly have absorbed a considerable amount of solar heat.

on the threshing-floor by a line of *zho*, moving patiently in a circle round a centre pole, urged on by a woman who accompanies her beating of the animals with a guttural song.[1]

Ladakis have a good many domestic animals. Only in the wilder and more desert parts are yaks the usual beast of burden. Stout little ponies come from Zanskar, steady and full of endurance and very sure-footed on the most rugged path. From Central Asia and Tibet the caravans bring numbers of mules and donkeys. The so-called *zho*

Ploughing in Ladak.

and the common Indian cattle are used in the fields and for the supply of milk and butter. On the farms there is a fair amount of poultry.

Pasturage is most important in a country where the cultivable area is so limited; and on the plateaux are innumerable flocks of sheep and goats. There are two breeds of each, one dwarf, the other unusually large. The dwarf sheep of Purig (a district of Kargil) has particularly succulent and tender meat, and is bred largely for the table. The large kind, between 2 and 3 feet high at the shoulder, which attracted the attention of

[1] There is a painstaking survey of agricultural conditions in Ladak by Moorcroft (*op. cit.*, Vol. 1, p. 271 *sqq.*), who stayed there for two years.

Desideri, is used as a beast of burden in Ladak and Tibet. Each animal carries 30 to 40 pounds of merchandise in two sacks hanging across his back. The trade in salt, grain, sulphur and borax (found on the Rupshu plateau) is carried on entirely by caravans of thousands of sheep, who take all day to cover a stage of 10 or 12 miles, nibbling as they go at the poor and scanty herbage and shrubbery of the high plateaux.

Large species of sheep, Ladak and Tibet.

The dwarf goat also comes from Purig. The famous fine wool called *pashmina* exported to Kashmir is not from this animal but from the large common goat. *Pashmina* is the short soft wool that forms the under layer of the goat's coat; after shearing it is separated with patient care from the longer stiffer hairs. The flocks of the Tibetan provinces of Rudok and Gartok produce most of it.

The animals of Ladak are the same as those of Baltistan and Tibet: snow leopards, a few wolves, foxes, some species of wild sheep and goats, antelopes and gazelles, hares, marmots, etc. One characteristic animal of Ladak and the Tibetan plateaux should be mentioned: the *kyang*, a wild horse or ass. Zoologists have not agreed whether to classify it *asinus* or *equus*; but to judge by its appearance, it belongs with the former. I once saw a herd of fifty *kyang* on the Rupshu plateau; but at Leh we were able to have a near view of this graceful animal. Dr. Peter had a fine specimen about 2 years old. Caught young and trained by its master it became perfectly gentle, following him about like a dog, even into the house; and would play with him in the fields, running after him with nimble and graceful motions. The *kyang* is covered with long soft tawny hair which grows lighter at the sides and becomes white on the belly and breast. There is a black stripe down the centre of the back.

Dwarf goat of Purig and large goat of Ladak.

The head, with its velvety muzzle, is typically donkey-like, so are the mobile open nostrils, the large oval eyes, the ears and the tail with its tuft of hair.[1]

Ladak, like Baltistan, boasts few varieties of birds. There are some vultures, large flocks of partridges in the valleys, pigeons and magpies and innumerable hosts

The *kyang* of Ladak and Tibet.

of small birds throughout the country-side. In Leh itself the crows predominated; I should think they must be of great use in the sanitation of the city. Every evening

[1] Marco Polo speaks of wild asses in Turkestan and in Mongolia (Yule, 2nd edition, Vol. I, pp. 90 and 226). Yule says that both correspond to Gray's *asinus hemionus*, and are identical with or closely related to the *kyang* of Ladak. Moorcroft (*op. cit.*, Vol. I, p. 443) gives an excellent description of the latter. Cunningham (*op. cit.*, p. 196) considers it a horse and says that it neighs; but Moorcroft's companion Trebeck found that the music of the *kyang* was like an ass's bray. Dr. Peter's animal, perhaps because it was so young, never let us hear its voice.

they came to perch in the little grove round the Residency; there was great stir and commotion and they filled the air with their discordant cawing.

While I was at Leh I completely reorganized the caravan. By the middle of March 150 porters had arrived from Skardu and 70 from Kargil. The Baltis came several days late, as always happens when the caravans are not escorted by a European. They had been badly chosen, most of them were in rags and physically unfit. I could keep only about 20, who were in good condition and anxious to go on with the expedition. I selected another 40 sound and strong men among the applicants from Kargil and the neighbourhood of Leh, for the summer work in the Karakoram, and two *jemadars* or foremen elected by themselves, who were answerable for their behaviour. I dismissed the two *shikaris* and all the Kashmir servants. They were devoid of ambition, satisfied with the little hoard collected during their service with the expedition, and without the slightest desire to follow us into unknown parts. In their place I enrolled in Leh two servants, two cooks and two *sais* to look after the horses. Among the servants was a youth from Yarkand, named Habibullah, who under Alessandri's teaching soon learned to collect the data from the meteorological instruments and even to read the angles of the theodolites with which the flight of the pilot balloons was followed. He so greatly profited from his lessons that later, on the Depsang plateau, instead of getting up at night to make the necessary observations for the study of the daily variation of the meteorological elements, he found it more convenient to register in the morning judiciously invented data of his own.

On the 10th of May our caravan leader, Rasul Galwan, returned to Leh from the Shayok valley where he had spent two months attending to the transport of about 1,000 loads of provisions almost to the edge of the Depsang plateau, although its slopes were still covered with heavy snow.

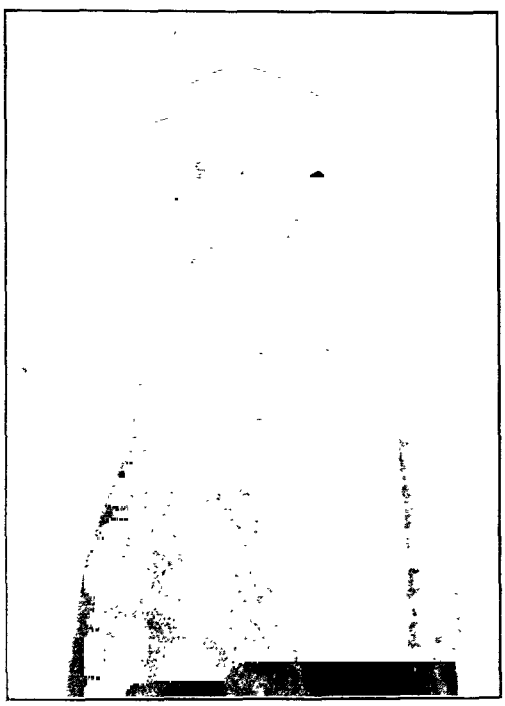
All was ready for embarking on the second half of the campaign; and on the morning of May 15th we left Leh, with feelings of lively gratitude for all the kindness and generous hospitality which had been shown us.

CHAPTER VII

BETWEEN BALTISTAN AND LADAK

By Giotto Dainelli

Among the Dards of the Indus—Geological features of Purig—Border between Islam and Buddhism —The castle of Chiktan—Kargil—Entering the Buddhist world—From *gonpa to gonpa.*



Phot. Dainelli

A Brokpa.

MY excursions from the base at Skardu, particularly the one along the Shayok, convinced me that winter, far from being an obstacle, in certain ways facilitates travel in valleys which previous visitors have found difficult if not impossible. In summer, in fact, one has to climb the precipitous mountain-sides, whereas in winter I found I could often get on faster by using the frozen river as a high-road. These experiences led me to discard the usual caravan route between Baltistan and Ladak, which leaves the Indus to follow the Suru as far as Kargil and then its affluent the Wakkha; crosses first the Namika-la, then the Fotu-la, and rejoins the Indus again at Kalatse.

Thus all the caravans avoid the Indus valley between the mouth of the Suru and that of the stream which comes down from the Fotu-la; and nearly all travellers have done the same, preferring to this wild stretch of valley the long and complicated way round, which, although it involves two passes over 13,000 feet high, presents no difficulties even for laden caravans.

But in that very stretch of the Indus valley, certainly because of its difficulty of

access, there persists a special population, which, from the little I knew of it, seemed to have ethnographic, anthropological and cultural characteristics different from those of its neighbours. I mean the so-called Dards of the Indus.

I made the few stages up the Indus from Skardu as far as Tarkutta (February 16th to 20th) with the rest of the expedition. Here, while my companions were setting up their tents, to continue next day along the caravan route to the oasis of Kargil, I pushed on up the Indus to camp in a half-ruined house in the little village of Marol. Not, however, without first stopping in Tarkutta long enough to take some more anthropological measurements among its population, which is entirely Brokpa, and to make a survey of one of their houses.

The Brokpa and the Balti houses appeared to me practically identical; a fact not without significance. Also the two peoples did not seem unlike to me, at least, judging from the general impression made by their physiognomy. The study of the anthropological data collected has confirmed my surmise.[1] Even in costume they seemed alike, by comparison with the other populations with whom I had successively been in contact. Though the Baltis wear a little cap of white felt, shaped like a shallow cone, while the Brokpas have a knitted one, generally brown, close fitting, with the edge rolled up to form a sort of brim, yet, where the two peoples live in close contact if not actually intermingling, this distinction may disappear, or indeed even be reversed in individual cases, a phenomenon like so many others which are to be seen where two distinct populations live intermingled or at least not kept apart by natural barriers which prevent a give-and-take in the matter of costume.

After measuring the Brokpas of Tarkutta I proceeded up the Indus, with the lightest possible caravan and this time alone. A new experience began: absolute solitude in the midst of that strange Tibetan world.

Tibetan, of course, only in a broad sense. These very Brokpas, though settled in a district—Baltistan—which all the old travellers recognize as the extreme western part of Tibet, still speak a Dard language: and this is really the great difference between them and the neighbouring Baltis, who use a Tibetan dialect, a sign that the former are a recent immigration, as I had already concluded, though on different grounds. But the people settled along the Indus and in the little valleys that come into it between the mouth of the Suru and the stream from the Fotu-la also speak a Dard tongue, however much their customs, habits and even religion may assimilate them to the Ladakis. It was then only by means of such analogies, certainly not by means of the language, that I got into touch with the Tibetan world.

I was convinced soon after leaving Marol that my departure from the caravan route had been justified: never in all my peregrinations through mountain country had I seen a valley more magnificently wild and savage. It is a deep narrow gorge, cut into an imposing granite formation; high cliff-like walls shut out the view, the

[1] See Biasutti, in *Relazioni Scientifiche*, Series II, Vol. IX.

valley bottom is so narrow that the river entirely fills it even now at the season of low water. There are no real paths on the slopes; when it was necessary to mount them it was actual rock climbing that I had to do, followed by my coolies. But for the most part the frozen Indus—in the sunless gorges the ice was very thick—gave me an easy road, even though I had to exercise the greatest care where the underlying swift current made the great sheets of ice insecure. However, the march was fairly quick and safe, though the first stage, between Marol and Ourdus, was very long.

I should have stopped at the little village of Grugurdo, the first settlement of Indus

[*Phot. Dainelli.*

Dards of the Indus.

Dards that I encountered on my march. But the utter poverty of its handful of houses deterred me. For although my excursions in the great valleys of the Karakoram had already familiarised me with destitution, the looks of Grugurdo were too much for me. I went on, hour after hour, in that frightfully desolate landscape, without seeing a single house, and meeting only two natives, Baltis on their way home from far-away Ladak.

I stopped the first night at Ourdus, and was received with a blithe and smiling welcome from the inhabitants—by which alone, not counting other signs, I should have known that I was no longer among the unresponsive folk of Baltistan.

These Dards of the Indus are certainly a race apart: never have I seen one so well

defined, characteristic and uniform. They all seem made in the same mould: great flowing beards, sharp and prominent nose, large intelligent eyes, a fine type on the whole, with a resemblance to the Afghans. The women are fine too, generally with delicate, almost aristocratic features and very large eyes. In dress, particularly among the men, one soon sees Ladaki influence; with the women there are differences—as in the use of trousers—which suggest the usual garb of the Balti women. We are in a zone intermediate between Baltistan and Ladak, and it is natural that it should have characteristics from both sides. But what is really typical of the country is the head-dress; for the women it consists of a cap of coarse brown stuff, with trimming in the form of seeds, fruit, flowers and grasses, almost as though they craved those things of which their soil is so niggardly.

Tradition says that these Dards of the Indus came from Gilgit; some few have gone over to Islam and have become entirely fused, even linguistically, with the Baltis. They are repudiated by the "pure" Dards who are not Moslem, will not even admit that they are Buddhist, and are very wary of contracting marriages with Baltis or Ladakis. A little because of their almost complete isolation, a little by reason of this strict endogamy, they have, it is true, been able to preserve their racial purity. But as for religion and customs—beginning with the pigtail—they are all more or less Ladakicized, even in their faith. For though they assert that this is different from the religion of the neighbouring Ladakis, yet at least in the outward forms of the cult it appears identical with Tibetan Lamaism. There may still be old observances, half religious and half national in character, there may be survivals of old taboos; but the little temples, the statues of the deities, their attributes, all the church furniture—they are all just what I saw later in the great *gonpas* of Ladak.

Next day I made a short stage above Ourdus, still closely following the Indus. I was now in the heart of the little ethnic island; and if, geologically, the scene—on account of its depressing uniformity—would not have made me linger, yet I did so out of my desire to collect material for a satisfactory study of the people.

I had some difficulty in measuring enough people to get a series equal to that of the Brokpas and the other populations which came into my anthropological programme. The Dards of the Indus are few in number, scattered in numerous little villages; so I had to stop at every oasis on my way, collecting the few men there were, often gathering them in from the fields where they were scattered for the preliminary work of the year. They came quite blithely, smiling at the novelty of these measurements to which I submitted their heads and bodies, and going away satisfied with the two annas I generously presented to them.

And thus, though the stage between Ourdus and Dah is actually rather short, it took me some time to complete it. Nor did I get my well-deserved repose even after I had done so. Truly the strangeness of my experiences of life in Tibet continued to impress me: partly because of the renown of which my poor person was now the object

among the natives, partly too because in Dah, there being no house suitable to lodge me, the head of the village put me in the temple. When in the evening I lifted my head from my maps, I saw myself surrounded by images of Buddha, by venerated lamas, monstrous demons, while on the farther wall—I was on the first storey—there rose from a large opening in the floor the bronze head of a gigantic Chamba, the object of special reverence in the little temple which housed me. Never could I have imagined a stranger lodging.

Phot. Dainelli

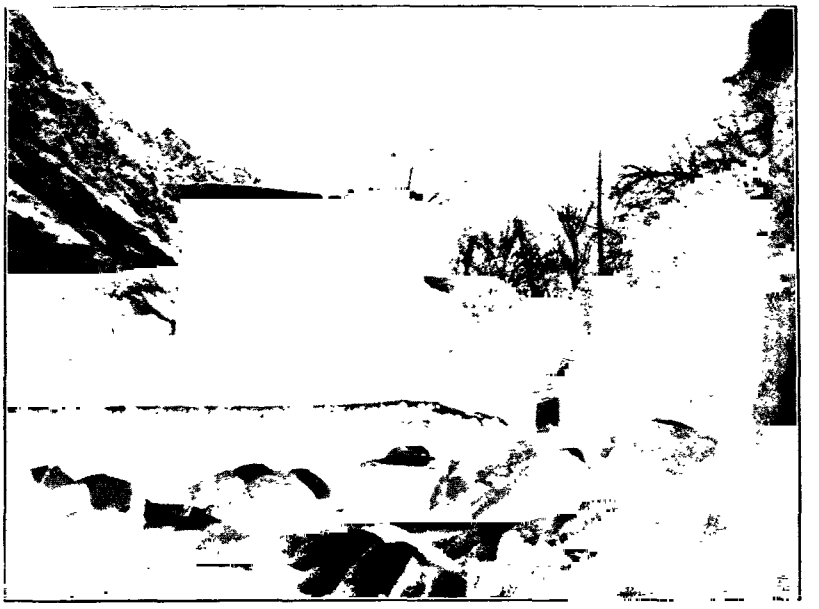
Dard houses at Dah.

I grew more and more convinced that these Dards, though indeed they have preserved, not only their racial characteristics, but also their original language, are profoundly Ladakicized. The houses are evidence of this. Here indeed, as in Baltistan, there are winter and summer quarters, though arranged rather differently and perhaps more reminiscent of the Ladaki houses. But the construction and the exterior features are more definitely Tibetan than is the case with the Balti houses.

The walls—apart from those of the poorest dwellings—are built with greater

structural solidity, including the first storey, which I have never seen made of lattice-work. Windows are frequent, real windows, and in the better houses there is always a balcony, reached from inside through a wide opening with a pretty moulding of wood or masonry above it. It is, indeed, the characteristic *rabsal* of the Ladaki house which here makes its appearance.

Near the temple which housed me was a large building, high and solidly built, with an unusually wide door giving on a sort of vestibule and with a fine balcony under the roof, in front of a primitive loggia. From one side of the compact mass of this palace-like edifice rises a round tower with little hanging turrets thrust out at the top towards



Phot. Dainelli.

The old castle of Dah.

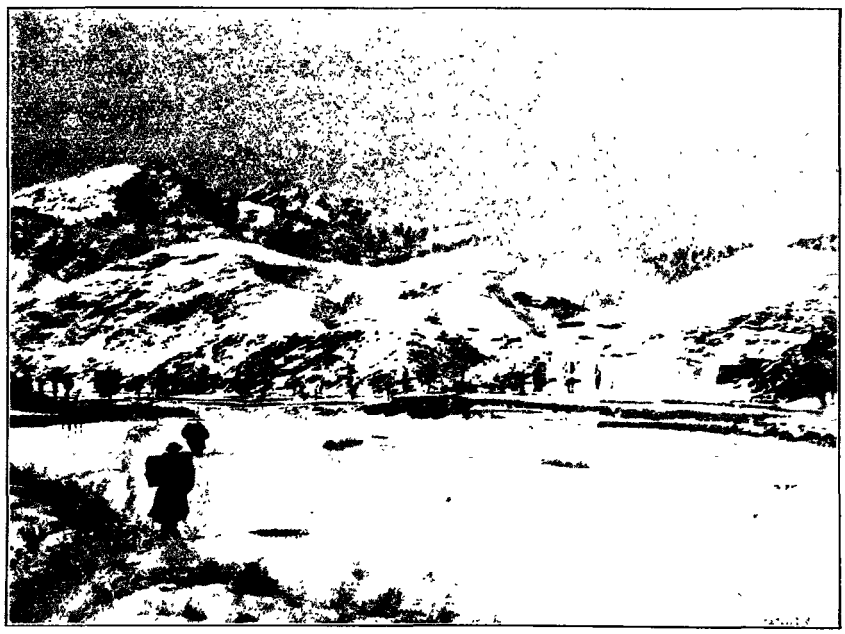
the four points of the compass, giving the building the look of an old feudal manor. It is, in fact, the castle of the ancient local lord: this district between Baltistan and Ladak was once divided into several petty domains, usually ruled by Dard princes, direct descendants of whom survive to this day.

Anthropological measurements, surveys of houses, investigation of place names and local traditions—these were my chief pursuits among the Dards of the Indus. But I was also able to collect interesting data about the geological history of the region, both ancient and recent.

Leaving Dah I continued up the Indus as far as Sanjak, at the mouth of a lateral valley on the left; and at Sanjak I entered into a world still new.

The few days I took to go up this short but untrodden tract along the Indus (February 20th to 23rd) were a period of the most intensive work; they did, however, produce most interesting fruit, if for no other reason than the acquaintance I made with the Dard population, at least in its physical characteristics—not a man in the villages and fields I passed escaping my scrutiny.

The next stretch, likewise short (February 24th–28th) was not less interesting, and from the geological point of view as well. As regards the recent history of the region, the so-called glacial period, when the glaciers of the Himalayas and the



[*Phot. Dainelli.*

In the Chiktan valley.

Karakoram, like those of the Alps, had a development incomparably greater than at present, I observed that the valley which I ascended from Sanjak displayed conditions which I should call anomalous: in that during the glacial period it was free from ice, a fact certainly due to the special topographical and altimetric features of the mountains which border it. But indeed taken all together the scene from the geological point of view was most interesting.

As one ascends the valley that comes into the Indus near Sanjak—in which are the well-known villages of Chiktan and Bot Karbu, and from which one climbs to the passes of Namika-la and Fotu-la, on the regular caravan route between Kargil and Leh—one crosses in succession several variously constituted lithological zones, to each of which

corresponds a different type of landscape. At first there continues the great granite formation to which the tract between Marol and Sanjak owes its terrifying aspect, prolonged in the valley below Chiktan and Bot Karbu, where the valley bottom is unbelievably narrow and wild. Then the granite yields to a formation very similar (also in its geological age) to the clays of the Tuscan Apennines, and the landscape alters completely : the valley widens, its slope becomes gentle, the bottom is broad and level from one side to the other, and even the sides, the ridges and peaks seem softened, almost rounded. As you proceed, a little before Bot Karbu but more particularly after that village, other rocks, and of a different age, succeed, very much older : here also

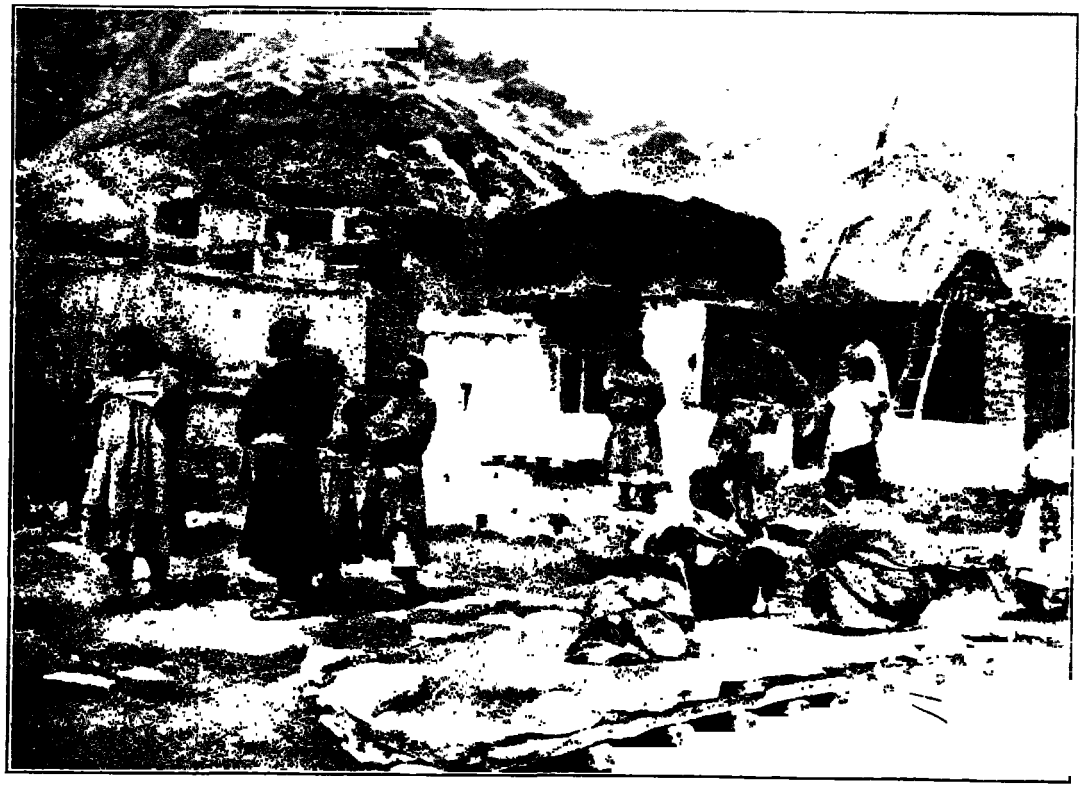
[*Phot. Dainelli.*

Houses at Shakar.

are schists, forming here and there gentle slopes and attenuated ridges ; but in the middle there are more or less developed patches of solid limestone, which form crests and summits sometimes of a great boldness. Beyond the Namika-la, in the Mulbek valley, leading to Kargil, the left side is all limestone of a different age and the landscape once more changes its aspect, with towering, precipitous rocky walls a little recalling our Dolomites. And when you get to Kargil, here too are changes : a wide basin, near the confluence of the Mulbek and the Suru, typically terraced, formed by clays and coarse alluviums, encircled on one side by rugged limestone mountains, and on the other by rounded hills of the usual clay-like schists.

Thus I passed a few days full of activity and toil. From Sanjak I went up the valley, and thence into one of its left-hand tributaries to camp in the village of Shakar.

Then I returned into the larger valley, following it up to Chiktan, whence I again passed without stopping through Shakar, and crossed a low pass into the next little valley of Yokma Karbu, where I spent the night. Then I went up the valley and at the summit crossed a pass over 13,000 feet high, descending to Kurit and thence to Lotsun in the Mul-bek valley. From Lotsun I rejoined the expedition at Kargil. I doubt if my route has ever been followed by earlier travellers; indeed the Indian Survey map does



Phot. Dainelli.

On the roofs at Shakar.

not show Yokma Karbu, which, however, is a big village and the seat of a petty prince who entertained me in his fine house.

The weather favoured me. Though on the first day it continued to snow heavily; to a depth sufficient to embarrass my movements. When it cleared, there was an intense cold in the early hours, growing milder as the sun rose higher above the horizon. One morning, I lost my balaclava cap which I was carrying in my hand, and both my ears were frost-bitten. One never notices this at the time, but I suffered from it for many months, until my return to Europe.

The most interesting stage from a tourist's point of view was between Yokma Karbu and Lotsun; it is very long and fatiguing, and crosses the Kurit-la, 13,300 feet high, which is not used even by the natives, at least in winter. There was a thick uniform covering of powdery snow, falling in avalanches even from the gentler slopes. The village of Lumsu, where the steep part of the climb begins, was almost lost in the waste of snow. Here I waited for the porters and we mounted slowly with many pauses. My luggage was limited to 10 loads, notwithstanding which I had that morning engaged 26 men, six of whom walked in front in Indian file without loads, to beat the track in the snow, the remainder following with the luggage. It was cold, the snow was soft,

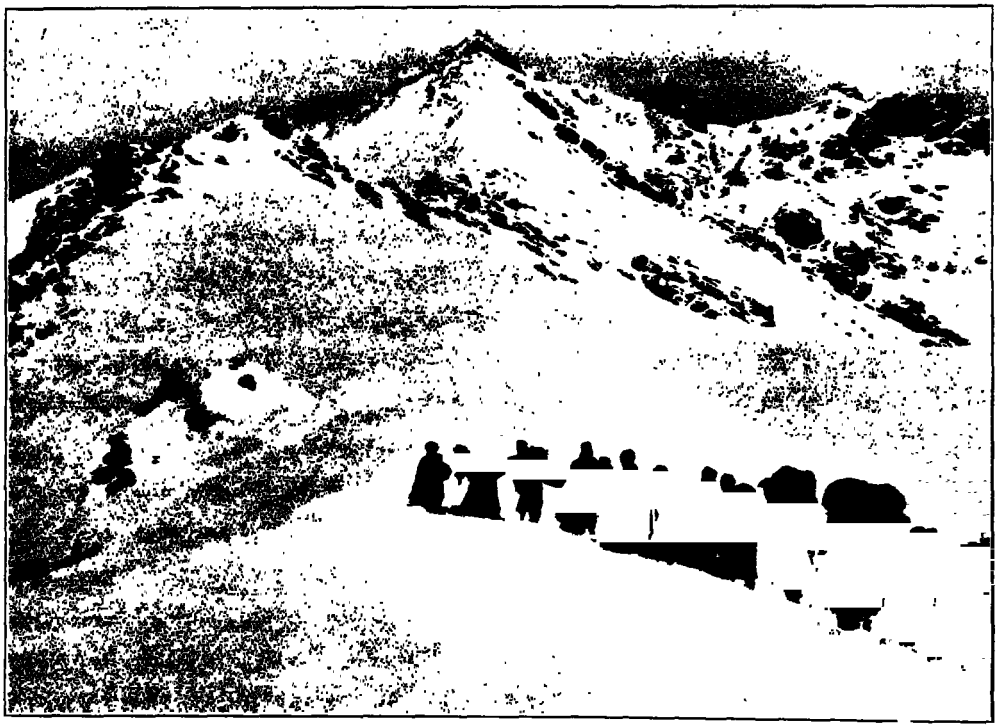
Phot. Dainelli.

Lumsu.

the glare blinding, and the men laboured painfully, often throwing themselves down exhausted. On the other side of the pass the snow was still deeper, the slope steeper, but it seemed easy by comparison.

The Suru basin as far as Kargil constitutes a geographical unit with a name of its own: Purig. I do not know what exactly are its limits in local usage, probably they are variable, as often happens with regional names. But the Suru basin has a population different from the Brokpa, Dard, Balti and Ladaki peoples which surround it—a population which I call Purig—and thus, wherever this population extends, to that point I also extend the regional name. Nearly the whole Chiktan valley and its affluents are included in it.

It should be noted that the Purigs too speak Tibetan, which clearly distinguishes them from the Brokpas and the Dards of the Indus, as far as language goes. And they are sufficiently distinguished—in their general habits and customs—from the Baltis, with whom they appear to have no immediate contacts. But it is hard to make a clear distinction from the Ladakis—the most obvious difference is the religion, the Purigs being Moslem. But even this is only relatively true; Islam is continually spreading, since no uninhabited region separates it from Lamaism as is the case in the Shayok



[*Phot. Dainelli.*

On the Kurit-la.

valley, and in this thickly and continuously populated district, some villages are Moslem to-day which a generation ago were Buddhist.

I have collected somewhat precise data upon this transitional zone between Buddhism and Islam. If earlier travellers had done the same we should now have an exact idea of the rapid rate at which proselytizing is proceeding. However, difficult as it is to establish a definite line, one may safely say that the Ladakis are all Buddhist, but that there are also Buddhists among the Purigs of the transition zone. And I think I can deduce from my investigations that the natives themselves can distinguish both from the true Purigs who have been Moslem for centuries. I have said all this to show

what great caution is needed in research dealing with populations, and how necessary it is to take with a grain of salt the assertions of old travellers. I believe them to be almost always wrong where they refer to transitional zones between one people and another; and the older errors are systematically passed on to the newer writers.

The transitional region—while it is fairly clear-cut in the upper Suru, because the population of the high mountains is after all very sparse—presents all the difficulties I have mentioned in the Wakkha valley, a right-hand tributary which joins the Suru at Kargil, and in the Chiktan valley: that is, in the two valleys crossed by the caravan route between Kargil and Lamayuru in the direction of Leh. All the travellers have passed by this way, and all, one may say, have spoken of the presence of the first Buddhist monasteries at Shargol and at Mulbek, but their attention was not attracted by the interesting phenomenon of the mingling of the two religions in the same village, sometimes in the same family.

The recent conversion from Lamaism to Islam can often be recognized by actual exterior signs: there are people, for instance, who have given up the Ladaki pigtail but have not yet adopted the Purig fashion of dressing the hair; and who still preserve the essentials of their former clothing to which perhaps they add some Purig innovation.

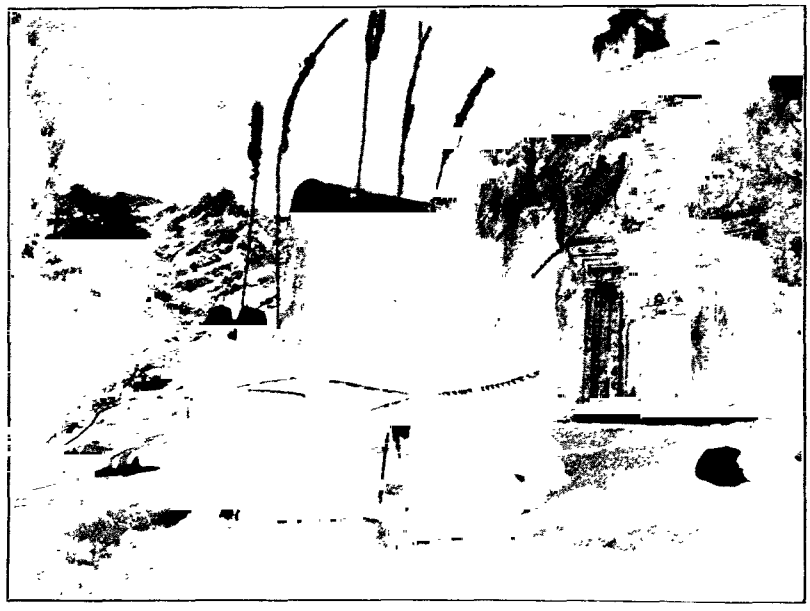
But in my excursions I have had means of observing, on this point, a fact of much greater importance, because it represents, in the new converts to Islam, a survival not of mere external custom but of ancient beliefs.

In the Chiktan valley, between the village of that name and another called Taze there rises on the low left side of the valley a small square structure, with a large door; windowless, with a terraced roof above its single floor. It looks solid and firm, but the original solidity must have suffered with the flight of time, for the massive wall has become insecure, and is supported by props. I may say at once that the little cubical building is betrayed even by its exterior appearance, by its small square plan, unlike any other local structure, as one of those primitive chapels erected by the Buddhists in the region: very simple structures compared with the complicated, though picturesque architecture of the later *gonpas* or monasteries. I have seen others along my route, usually abandoned and in ruins. Tradition says that there were 108 in all in the whole region, scattered between the Zoji-la and Purang, built by the devout Losava after his return from India, where he had completed his religious education. I believe that even the so-called *gonpa* of Alchi should not be considered a monastery but rather a temple, a shrine, of the same epoch and the same primitive type, round which other similar little chapels had already risen in early times, rich in adornments preserved to this day: not the sole example, indeed, of the survival of these primitive chapels and primitive decorations (with pictures and sculpture); I myself have seen others in the district of Leh.

This chapel in the Chiktan valley shows its antiquity not only in its structure, but

also in the design of its door: the only outer part, that is, upon which the primitive art of Lamaism could have left a mark. The single door, in fact, whose width is greater than its height, is flanked by two wide wooden strips, and surmounted by a wooden cornice; the whole covered with a fine carved ornamental design, the pattern of which, alas, has been obliterated by time. Similar, I would say almost identical, doors exist in the chapels of Alchi.

The interior too is characteristic, and follows the arrangement of similar temples I have visited elsewhere: a single square enclosure, with the flat ceiling sustained by four large pillars of roughly fluted wood. I may be mistaken, but I thought I saw



[*Phot. Dainelli.*

The old *gonpa* of Izgang.

here the model for the identical columns in some of the old mosques of Baltistan. For instance that of Kiris, which I have described.

Round the walls are none of those large statues of Lamaic deities, which are to be found in all the *gonpas* of Tibet; instead there are several rows of painted medallions, which should contain the images, also painted, of deities or Buddhas or venerated lamas. But all this is almost entirely effaced—the work of time, but even more of men who have been converted to Islam and thereby become iconoclastic. There remains, however, that characteristic ornamentation of the walls with many medallions, as I have seen it in other primitive chapels, but not, as a rule, in the later *gonpas*.

In the centre between the pillars is a little clay elevation; and from it rise two

wretched little altars, facing the front door and the opposite wall; upon these are the small copper bowls for the lighted wicks, but no images of deities. Leaning against the walls are slender branches, long and straight, with the bark cut to represent twisted ribbons, whose ends are covered by closely packed little yellow flowers, and hung with a sort of thin chain made of red ones. Other branches have fastened to them great festoons of red flowers, from which other smaller ones depend, down to very tiny garlands.

Ladaki Buddhists make pious pilgrimage to this old chapel. But it is strange and interesting that the daily offerings of wicks and garlands come from the inhabitants of the next village, who have been Mussulman for three generations. I asked them if they prayed to Allah in the old chapel, but they said no. They could not tell me to what god they addressed their prayers; to the spirit, said one. At any rate the survival of something is evident, some rite belonging to the original now abandoned faith.

However much, then, my investigations might have enabled me to distinguish Ladakis and Purigs, independently of their religious faith, yet I wanted to avoid the transitional zone for the anthropometric measurements I was taking, a series of 50 of which I intended to gather for the Purigs. The most typical Purigs are certainly in the Suru basin, and accordingly I made Kargil my principal centre of investigations. They proved very interesting.

The name Purig, indeed, is not merely an artificial distinction for a group of people inhabiting a small and topographically well-defined territory. Nor is it a distinction based merely on their customs, in particular on the clothing peculiar to them. The series of measurements which I have taken prove them to be a small group with special characteristics which lead to the inference that here, in Purig, there is preserved in greater purity the type of the earliest settlement, which one may take to be the aboriginal stock, that to which Biasutti, who has worked out my measurements critically and in detail, would reserve the name "Himalayan."[1] This conclusion, based on differential somatic characteristics which evidently escape the eye, gives scientific confirmation to my surmises derived from the mere observations of physiognomy and from the few native traditions I was able to gather. I had in fact reached the conclusion that—quite independently of the shift of population indicated by the Brokpas and the Dards of the Indus—two similar phenomena had occurred in the region: one larger, from the west: another and lesser, from the east. The influence of these must have dwindled as they got farther and farther away from the district of their origin; their influence must accordingly have been lowest at the central part of the region, where it follows that the ethnic characteristics of the pre-existent population would be best preserved. And this centre of the entire region is, precisely, Purig.

But the inhabitants have no tradition or consciousness of any really important ancient migrations. Traditions there are, of people coming from a distance, and actually

[1] *Relazioni Scientifiche*; Serie II, Vol. IX.

from the lower but still mountainous stretch of the Indus; but these are cases of movements neither very ancient nor at all considerable, referring rather to individuals or families—the families in fact, who held sway here in Purig for a long period, fundamentally feudal, which came to an end only about a century ago—traces of it are everywhere to be seen, even in Ladak, in the countless remains, sometimes on a monumental scale, of fortifications, castles, walled cities, now abandoned, rising on some rocky spur and dominating the straggling villages in the valley beneath.

The finest specimen of this feudal period I saw in the valley of Bot Karbu. I was going up beyond the little old Buddhist temple where recent converts to Islam still come to pray; when at a turn of the road I saw before me a sight fantastically grandiose. A small rocky spur ran out into the centre of the valley, and upon it rose—lofty, slender, delicate, built on several terraces rising one above another—a castle, the ancient castle of Chiktan. Down in the valley, at the foot of the other side of the spur, nestle the few houses of a poor village.

A steep narrow path winds up the rock; at a certain point there are the ruins of a gate which led to the dwelling of the prince. On both sides are the remains of unimportant buildings, houses for servants, perhaps, stables, soldiers' quarters; all ranged one above another on the steep slope. Then, below the summit, a rectangular palace, with slanting walls, almost taller than it is broad, with little windows and two large projecting balconies under the roof. On the summit itself, another building in the same style, but fantastically tall and slender, it too with little windows and an immense balcony. And springing from its roof still another, like an offshoot, likewise very high and slender, again with little windows and balconies. The peak, the servants' quarters, the frowning castles, the topmost one surmounted by its turret, all this forms an ensemble like a pointed pyramid, very slim and lofty, with an irregular jagged profile. On the rocky ridge connected with the spur are the remains of walls and bastions for defence.

I climbed up to the castle; inside all is desolation and ruin. Only one storey of the first palace is to be seen, the one with the fine balconies—it is empty, despoiled of its adornments. I saw nothing but one wood carving, very primitive, of a human figure with two conventionalized interlaced fishes. On the upper building the ends of beams project from the masonry to support a sort of cornice: and these are rudely carved into human heads and griffins with gaping mouths. Nothing else, but a confusion of steep dark stairways, enormous halls, mysterious little passages, spacious granaries, tiny little chambers, and wide verandahs, which one could only guess at, because everything is tumbling down, walls, stairs and ceilings, and threatens to fall on your head.

A long history attaches to the castle of Chiktan—of struggles, victories and defeats. I could not reconstruct it all. Eight or nine centuries back—30 generations ago—there came into this region from far-off Gilgit, his native land, Testa Khan, who became the lord of a large part of Purig. Sod, near Kargil, was his seat. But his domain,

The castle of Chiktan.

after 11 generations, was divided between two brothers: one continued prince of Sod, the other took Chiktan, from which the smaller principality of Yokma Karbu was afterwards detached (his last descendant was my host during my expeditions in the region). But in the course of time the two dynasties became involved in a ferocious struggle. About 1600, Chiktan called in the help of Jamyang Namgyal, the ruler of Ladak, and Sod sought the aid of Ali Sher Khan, the Rajah of Khapalu. The Ladaki king responded, and conquered the principate of Pokar (Mulbek), that of Kartse in the Suru valley and Bot Karbu. But he was defeated by Ali Sher Khan and taken prisoner. Peace was sealed with a marriage between the Ladaki king and a daughter of the Balti rajah.

This is the most important episode in the history of Chiktan. But it is an interesting fact that all these petty princes of the Purig region are Dards, coming from the district of Gilgit, like the rajahs of Baltistan and others who held power along the Indus, westward of Ladak. According to native tradition, they were preceded in the region by the Dard population itself, which, for the special reasons which I have mentioned, has preserved still unaltered its ethnic characteristics, and also, at least in part, its own customs.

My excursion, interesting and rapid despite the difficulties caused by the heavy snow, came to an end at Kargil, where I rejoined the expedition. Dr. De Filippi had already left with the transport caravans for Leh; but the other members of the party were intent on the work of the Kargil geophysical station.

At Kargil too there was a great deal of snow, and more was falling. No excursions were possible in the few remaining days (from February 28th to March 4th). As regards the various geological formations round the basin, I had already learned enough about them in the preceding days and from the morphology proper to each: masses of granite, green eruptive rocks, tertiary schists, each had its special characteristics, one could almost mark them off from the window of the bungalow, while the snow-storm raged outside. As for the great terraces of the basin, which have attracted the attention of all previous travellers—though none of them explained them aright—in the two crossings I made of them, from the steep side slopes which were free of snow I was able to gather confirmatory evidence for the reconstruction, as far as I could carry it, of the recent geological history of the region, that is, the period when it underwent all the grandiose changes of the glacial period: I will only say, that at a certain time there extended to this point the great lake of the Indus, which as I have said must have been caused by an enormous barrier near Kutzurah and below Skardu.

Kargil itself presents no especial interest, notwithstanding its present importance. The former centre, the ancient seat of the petty feudal princelings, lies in the little lateral valley of Sod, off the track of the main routes. Down along the rivers—the Suru and the Wakkha, which meet at this point—are numerous small hamlets. The present centre, with the Dogra fort, the primitive bazaar, the bungalows, the *serai*, the government

houses, the warehouses, is scattered on the left bank of the Suru, above its confluence with the Wakkha. It does not look like a true settlement or real nucleus of population, and also it is too modern to possess any interest. Yet important it is, certainly; for Kargil, at the foot, one might say, of the northern slope of the Zoji-la, the only Himalayan pass of the region, lies at the parting of the two caravan routes, one down the Indus, towards Baltistan, the other up the great river towards Ladak, Tibet proper and Chinese Turkestan. It is thus an important stage on the trade route between India and Central Asia. We were still in midwinter, and no caravan was moving but ours.

I had meant to go up the Suru and cross some high passes to regain the valley of Bot Karbu and the main route to Leh. But what I heard of the snow conditions convinced me that it would be folly. My task was then reduced to the survey of some houses, increasing my series of records of native dwellings, and to more anthropological measurements. This enforced confinement made me more than ever anxious to get on to Ladak, where new sights and experiences awaited me, where I should penetrate into the heart of the Buddhist world and draw near to the scenery of the Tibetan plateaux.

My impatience became so great that I did not wait for my companions to finish their series of observations, but left Kargil to proceed in four leisurely stages to Lamayuru (March 4th to 7th), taking with me not only my own light luggage but another caravan with part of the baggage of the expedition.

Between Kargil and Lamayuru I was on the well-known trade route, about which therefore I need say but little. I made my first stop at Pashkyum, a big village, at the mouth of the Wakkha valley in the Kargil basin; where I inspected the remains of another of the old castles of the former lords of the region, and made the acquaintance of the handsome young descendant of the princes of Chiktan, who came to pay his respects. By this time another name had been added to that of *Patar* Sahib (the stone sahib) given me earlier by the inhabitants: I was now known also as a student of the natives. Such are the two faces of the modern geographer. And thanks to the arrangements of my friend Hashmatullah Khan, in every village I found men ready to be measured and to reply to my questions; for of course I continued with my toponomical researches as I went on. My knowledge of the native houses increased at the same time: as we left Baltistan behind these began, while retaining the same structure, to be more comfortable and solidly built. The house where I lodged at Pashkyum was large and handsome, and one I visited afterwards at Mulbek was decorated with mural paintings. But at Mulbek we are already in the Buddhist world, and there was in the air the feeling for art which is so widespread among the Ladakis.

Actually the Buddhist world begins before Mulbek—at Shargol, where the first *chorten* and the first *gonpa* or monastery are met with, the latter interesting because it is an example of the utilization of natural conditions. It is not built on the ground but inside the natural cavities, perhaps artificially modified and enlarged, in the high vertical

wall of a terrace of conglomerates. Nothing projects from the rock, but the white façade of the little temple stands out against the black background—for it is a temple, strictly speaking, rather than a monastery. I have seen but one other such example on all my excursions: some little dwellings, built into conglomerates not unlike those at Shargol, in the upper valley of the Indus, in Ladak, near Chumatang.

As we went on, more and more signs of the religion were in evidence: *chortens* and *mani* walls and *lhatos* and *gonpas* and the great images of deities cut in the rock a little above Mulbek. We crossed the Namika-la, through gentle undulating country, which I had already seen from the Chiktan valley, and descended to Bot Karbu. The name

Phot. Dainelli.

Gonpa and *chorten* at Shargol.

with the prefix Bot, meaning Buddhist, to distinguish it from the Karbu in the Dras valley and Yokma Karbu between Chiktan and Sanjak, shows that we are now in Ladak. But we are actually in that transitional zone of which I have spoken.

Both this high valley of Bot Karbu, going up to the Fotu-la, and the Lamayuru valley to which it leads, are interesting, particularly the latter near the village and the famous monastery; for the whole valley bottom is filled by lacustrine sediments formed at a time geologically very recent, but of course before man had added his marvels to those of nature. The clay formations of the ancient lake are very characteristic, and seem identical with the typical clays of our Sienese Tuscany.

I made a brief stay at Lamayuru, to visit the famous monastery, measure my first

Ladakis and collect data for the reconstruction of the geological history of the region; also to await my companions. There the physicists set up their tents for another series of observations, while two other members of the expedition, without special occupation for the time, decided to come with me, since my devious route between Lamayuru and Leh would bring us within reach of the principal *gonpas* of the region.

That journey (March 9th to 18th) is still, for me and I think also for my companions, one of the most interesting that we have made.

[*Phot. Dainelli.*

Ascending the Namika-la.

We went down to Kalatse on the Indus. On the way my attention was drawn to ancient inscriptions and designs scratched or cut on the rocks. I had seen similar ones at Mulbek, apart from the less important ones which one sees about everywhere. Here at Kalatse I witnessed for the first time a religious service in a little Buddhist temple. I attended other more important ones in the temples of Temesgam and towards the end of the same excursion I saw in the large monastery of Phayang the great yearly festival which is so famous for the richness of the costumes and the elaborate symbolic dances.

From Kalatse two parallel roads lead to Spituk, which is close to Leh: the usual

road which consistently follows the Indus, and the " upper road," some distance away on the right bank of the river, which joins the other only for short stretches mostly towards the end. As I wanted both to carry out my geological and morphological researches on the conditions in the great valley of the Indus and to visit as many *gonpas* as possible, we followed now one and now the other of the two routes.

We used the lower between Kalatse and Nurla, reaching the village of Temesgam by a lateral valley, thence by the upper road to beyond Himis Shukpa, descending again to the Indus to see the monastery of Rigzon and the small valley of Yangthang. Then

Phot. Dainelli

One of the temples of Temesgam.

by the lower road as far as Saspul, including an excursion across the river to visit the ancient little chapels of Alchi. From Saspul we took the upper road to Ling and the *gonpa* of Likir, returning to the lower at Bazgo, following it to Nimu and leaving it again near Phayang.

This repeated to-and-fro between the bank of the Indus and the middle height of the slope on the right side enabled me to inspect at close hand the rocks of the great valley, and to explain—at least to some extent—its asymmetrical character. For the left flank of the valley rises from the river sheer but low and almost without tributary valleys, while the right one is farther off, higher and more massive and interrupted; the space between being occupied by a series of low hills, almost entirely flattened down. These are made of schists; the right side is granite, the left green eruptive rocks; the

three rocky zones which I had already noted in Purig, but which here have determined the course and the shape of the Indus valley. And moreover, that extended strip of low mounds above the level bottom between the river and the granitic right side of the valley proved to be the surface of a former valley level; and on it, precisely, the "upper way" almost always ran. The initial difficulty being surmounted, one deduction led easily to another, and I had glimpses of the successive changes in the course of the Indus and its principal affluents, in this stretch between Kalatse and Leh, from the time when they abandoned the old upper level to the time when they reached the present

[*Phot. Dainelli.*

The *gonpa* of Phayang.

one. Not very great problems, these, but fascinating—and there were many allied ones which became clear to me: that great deposition of alluvium in all the side valleys on the right, which seem as it were choked by the great mass of pebbles, or the remains of a large lake which once filled the Indus valley above Spituk for a good many miles.

This section of the Indus valley is among the most thickly populated, and therefore I had to concern myself with human problems as well; villages and agriculture, place names, communal life, types of dwelling-houses, anthropological measurements.

By this time we were definitely in Ladak. The transitional zone was past, the religion entirely Lamaist-Buddhist, the costumes plainly Tibetan. The houses were still of the Balti type, that is with winter and summer quarters; but more solidly built, in a less primitive style, with typical features not merely utilitarian, but also ornamental

—projecting balconies and terraced roofs. The interior decoration was often quite exquisite, especially in the private chapels, full of cult objects, often of artistic value.

And the costumes both of men and women had changed : if one recognized features in common with the Dards of the Indus—features which the latter received, not gave —and a gradual passing into the Purig style, yet there was an obvious departure from the simplicity of the Baltis and Brokpas. Here, in the clothing as in the houses, there was a quest for colour and decoration which contrasted with the barren landscape but corresponded perfectly to the artistic temperament of the people.

Apart from the present native life, the remains of the past must attract the attention of the traveller in this region between Kalatse and Spituk. I will not describe the fort on the Indus almost opposite the mouth of the Lamayuru valley ; like the fort at Dras, and the one at the foot of the rock of Skardu, and those at Kargil and Leh, it belongs so to speak to the present day, having been erected by the Dogra conquerors less than a century ago.

But near Kalatse, on a large isolated rock by the river, are the shattered remains of a small castle of considerably older date, from a time when the district, like Purig, was divided into the small domains of local princelings who came from far-away Gilgit. And the mountain-side behind the village of Temesgam has a whole complicated system of walls and towers and outworks, remnants of a later period connected with the history of the dynasties of Ladak. There are similar remains at Bazgo and elsewhere.

Among the ruins of these castles, which are real fortified cities, temples and monasteries rise to-day ; others are hidden in the valleys or cling to precipitous slopes : Temesgam, Rigzon, Alchi, Bazgo, Likir, Phayang, Spituk—to mention the most famous in this part of the valley. All are remarkable for site, for structure and for the cult treasures preserved in the hundreds of chapels. I have seen them all, from the oldest, such as Alchi, to the most recent, like Rigzon, with lamas of the red sect and lamas of the yellow or reformed. In some I have assisted at wonderful festivals, where the religious symbolism is accompanied and interpreted by ceremonies and dances which only superficial observers could regard as " devil-dances."

CHAPTER VIII

EXCURSIONS IN LADAK

By Giotto Dainelli

The capital of Ladak and its Moslem inhabitants—The Mon—Springs, and "artificial glaciers"—The Rupshu plateau—Garzok *gonpa*—The Changpa nomad shepherds and their tents—Lake Pangkong and its history—Return to Leh—Excursion in the Zanskar valley.

Phot. Dainelli

A Ladaki.

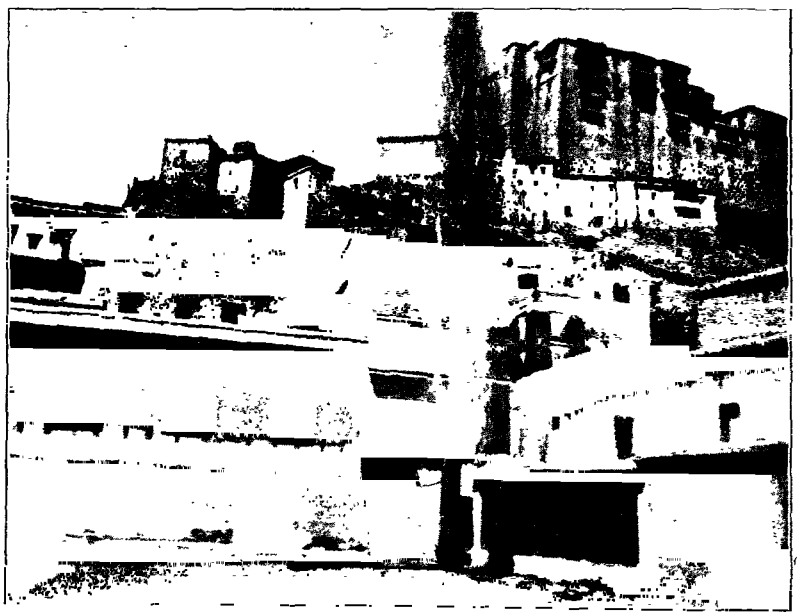
IT was at Leh that the main body of the expedition settled for the spring; I did not remain there long at a time, but returned thither on three different occasions (March 19th to 26th, April 23rd to 30th and May 7th to 14th), either to put in order the notes and collections from my latest excursion, or to prepare the next one; I cannot say to rest, for I was unwilling to forgo whatever the city, its surroundings or inhabitants provided that might further my researches.

My knowledge of Leh is due above all to the friendship of Hashmatullah Khan, and of the principal lamas, notables and merchants of the district, who opened all doors to me and allowed me to penetrate into the life of the people.

The monuments of Leh—for such indeed are the large royal palace, which dominates the city with its picturesque and imposing mass, and the numerous temples, particularly the older ones, on the rocky ridge behind the town and inside the now ruined encircling walls of the ancient feudal castle—have often been described. But I must mention the existence of a mural painting in one of those temples, the subject of which is not sacred but profane, for in it I seem to see something of particular import-

ance for the history of local costume—which appears, on the whole, to have changed but little in the past few centuries. The observable changes must have come in our own day, since the more remote mountain villages have not had time to catch up with them.

In Leh and its vicinity there lives a small group of Moslems. I do not refer to those scattered in the farmhouses along the Indus in that straggling group of dwellings which constitute the village of Shushot. Those are Baltis, of old or more recent colonization. True colonists, they still keep to ways and customs which are their own, while adopting some from the Ladakis as well. But at Leh—and to a smaller extent in some



Phot. Dainelli.

Mosque, and corner of the bazaar, Leh; above, the old royal palace.

of the other centres of the region—there are Moslems who—save for the pigtail and some slight differences of costume—live and consider themselves as Ladakis. These people are the so-called Argon, and they are half-breeds.

A few Moslems from Kashmir, and a few, rather more numerous, Hindus from Kashmir and the Punjab live at Leh for business reasons or in official employment. The Hindus may not marry the Ladaki women, nor on the other hand may they recognize their illegitimate sons, who would by reason of their maternity "lose their caste." The children are therefore abandoned, because the mother's family will not recognize them either, and are gathered to the ample bosom of the Mussulman community. It is thus that Islam makes recruits in Ladak, and it cannot be said that they are made by conversion. The situation is bad for the character of the people and for the country,

which draws from Lamaic Buddhism a quality of serenity and of artistic consciousness absolutely lacking to the Mussulman Baltis, even though these derive from the same racial stock. But here the Buddhist religion, with its monasticism and its polyandry —its most characteristic social features—keeps the money in the family and produces an evenly diffused well-being throughout the community, making it gayer, as well as serener and more artistic. A sense of humour is also quite evident, though it may manifest itself in forms inexplicable to us.

But in Ladak, as in the other regions we had so far traversed, there was a particular problem which stimulated my curiosity. True, I should not have regarded it as a problem, but for a statement in a recent work upon the history of this population. Ever since the time when on the way down the Indus to Skardu at the beginning of our travels, I studied the typical social unit represented by the oasis of Tolti, I had known of the existence of a small number of families, who, in addition to working their fields, have a special calling, that of musicians, and are distinguished by the name of Mon. The peasants look down upon them, and they may not intermarry with the rest. I have seen the same little group in nearly all the larger villages of Baltistan, also in Purig and Ladak: always musicians and always held in a certain contempt by the other natives.

I confess that I gave no especial attention to the phenomenon, knowing that in India too the art of music is in disrepute; until I read the statement that the Mon are descendants of the ancient and actually indigenous population, despised by their conquerors as inferiors. An ethnic difference between the Mon and the rest of the population was also implied.

Wherever I have seen Mon, I have tried to observe their physical characteristics, and have made careful comparisons with those of the community in which they live. They seem to be Baltis among the Baltis and Ladakis among the Ladakis. I believe that the measurements I have taken confirm this finding. And indeed it would be strange if the primitive population of the region had not been assimilated by its conquerors, or concentrated in some small and less accessible locality, instead of—after being almost entirely destroyed—leaving their survivors for centuries and centuries down to the present day, scattered in small detached nuclei. It would be a unique phenomenon, surely, or at least more than unusual. It is also strange that these little groups should have invariably become musicians, adopting an art held in small esteem.

I cannot believe all this. What I think is that the Mon are not different from the rest of the population, but that they are a group recruited from such people as—out of wretchedness, or indifference to local standards, or any other reason, for instance simply to earn money—have adapted themselves to a despised calling. As for the name, I think it is rather socially than ethnically derogatory—like many we use in the west to refer to people we consider different and lower. "Barbarian" and "pagan" in the past, like "gypsy" to-day—what did they mean if not something extraneous and inferior, without any more precise ethnic significance? It is the same, I think, with the

Mon. And for this and no other reason the inhabitants of the southern slope of the Himalayas are sometimes called Mon, and the name " castles of Mon " is given to the ruins of feudal castles which the natives know nothing about save that they are different from other structures to-day.

At Leh, of course, I made plans of houses, investigated place-names, took anthropological measurements; I was even able to measure some travellers from Lhasa, who showed typically Mongolian characteristics by comparison with the natives.

Geologically there was nothing new to note in the most ancient physical transformations in the region. But evidence of more recent change is always interesting: thus I saw near Leh, in the valley which comes down from the Kardong-la, a moraine system left by one of the last expansions of the glacial period, in so perfect a state of preservation that it might be used for a model. Of course I made an accurate survey of it.

A more prolonged stay at Leh would not have lacked instruction for me; however, here too I preferred to give my work the extensive character which in Baltistan and Purig had reaped such rich and varied results. What little we know of the whole eastern part of Ladak, up to the confines of Tibet proper, shows that the region may present very interesting features, being a sort of transitional zone leading to the great Tibetan plateaux, with characteristics of its own, particularly its innumerable enclosed basins and salt lakes. Moreover, on the way east one would come among nomad peoples, passing from the area of the settled Ladaki tillers of the soil to that of the nomadic Changpa shepherds; and in the Changpas I expected to recognize the first real Mongolians, from whom perhaps came that slight infiltration of Mongolian blood which one observes here and there among the white races of the upper Indus.

My plans were quickly made and I left on a long excursion (March 27th to April 22nd) to the plateau of Rupshu, the border of Tibet and the lake of Pangkong. As usual I travelled with a light caravan, taking two small Whymper tents in case of need, though I only set them up two or three times, and lived chiefly in native houses or in chance shelters like the summer huts of the shepherds or the tents of the nomad Changpas. This last experience was fraught with consequences, for it brought me a companionship which followed me faithfully for the rest of the trip.

Without wishing to exaggerate the natural difficulties I met with, due to the earliness of the season, and the great heights, often over 16,000 feet, which I had to surmount, I cannot deny that this excursion required a good deal of physical resistance and strength of purpose. My greatest enemy was the snow. It disguised the lie of the land and made walking very difficult and tiring, it fell sometimes with the violence of a blizzard. During my absence, the physicists of the expedition made an attempt to reach the Rupshu plateau with the complete equipment for a geophysical station. With ample means of all sorts, men and animals to make a road for them, and the experience of Petigax to boot, they failed to reach their goal. While they were turning back

to Leh, I was moving with my little caravan across the plateau, traversing it in various directions, only deterred from descending toward the southern slope of the Himalayas, as I wanted to, by the immense quantities of snow, which would have prevented the search for fossils which I wished to make. I found the lakes of Rupshu completely frozen, even the largest, the Tso Moriri; I crossed its whole length on the great sheet of ice, as far as Garzok *gonpa*—though I had to be careful about some large cracks caused by pressure near one of its banks.

Farther on, the only difficulty I had was in fording the Indus opposite Nima, largely because of the sheets of ice which it brought down; the wind was sometimes hostile, but it did not hinder my march, though rendering it disagreeable. I found the big lake of Pangkong also frozen, but I did not need to take to the surface, for the banks were almost free of snow. Snow in quantities, however, made difficult the crossing of the Chang-la (16,000 feet) on my way back to Leh. The whole excursion, however, went off according to programme—thanks in large part to the men who followed me so loyally.

I should add that I had limited the weight of the caravan—the lighter a caravan is, the more mobile it can be—by confining myself to bare necessities, like pasta and rice for the soup, coffee, tea, condiments, a few preserves and biscuits. The resources of the country must do for everything else—this, from times immemorial, has been the rule of war. And the resources, quite unexpectedly, took the form of game. I say unexpectedly, because while the region, in particular the slopes of the Karakoram, affords large game, like ibex, wild sheep and other ruminants, you will not catch them unless you make it your sole aim, and even then you may return to camp without a single specimen: and in my previous excursions I had not happened to see any birds. I had heard that there were snow-cock, but although the winter should have driven them into the valleys, I had seen none. On my present excursion, however, I was more fortunate. Soon after leaving Leh, I saw many large flights of pigeons, in the fields at the bottom of the valley, where the spring warmth was melting the snow. It was easy with a single shot to get enough provision for a whole day. And it was the same all along the Indus, until I reached the inhabited and cultivated zone; on the Rupshu plateau the small game was extraordinarily abundant. In the Puga valley, where I descended to the Indus from the plateau, there are numerous hot springs, and one large cold one, the only one I have seen. The water, because of its temperature, spreads out without freezing along the flat-bottomed valley, forming little pools. Never have I seen so many birds congregated together in so small a space: water-fowl of every sort, large and small, fluttering about in flocks to plunge themselves into the still and tepid water. The man whom I had appointed commissary killed a good many, and the intense cold enabled us to keep them for several days. Wild animal life seems particularly abundant on the Rupshu plateau; I saw wild asses, also hares, which were delicious.

Thus I was able to live largely on the resources of the country, and at Puga I had

the satisfaction of quenching my thirst at a spring of pure water, after many months of tea as my normal beverage.

This lack of springs throughout the region is really strange. Hot ones, with more or less mineral deposit, are frequent: I remember many in the Braldoh valley, and those in the Basha and Kondus valleys; on the present occasion, besides those at Puga, I saw very copious ones at Chumathang along the Indus. But the only, or almost the only fresh water one I have met was this one in the Puga valley.

The scarcity of springs is certainly one of the causes of the poverty of the country. Cultivation is not possible except with irrigation; and as the natives have no means of taking the water to a higher level, the fields and consequently the villages can only be situated where advantage can be taken of natural slope. One sees quite deserted alluvial terraces along the banks of the large rivers—simply because no one knows how to bring the water up to them. It can be brought much more easily, of course, from the side valleys to the alluvial deltas at their mouths, where they join the larger valley, but only where the stream in the lateral valley is perennial. For in the general absence of springs, a perpetual water supply can only be had where there are glaciers.

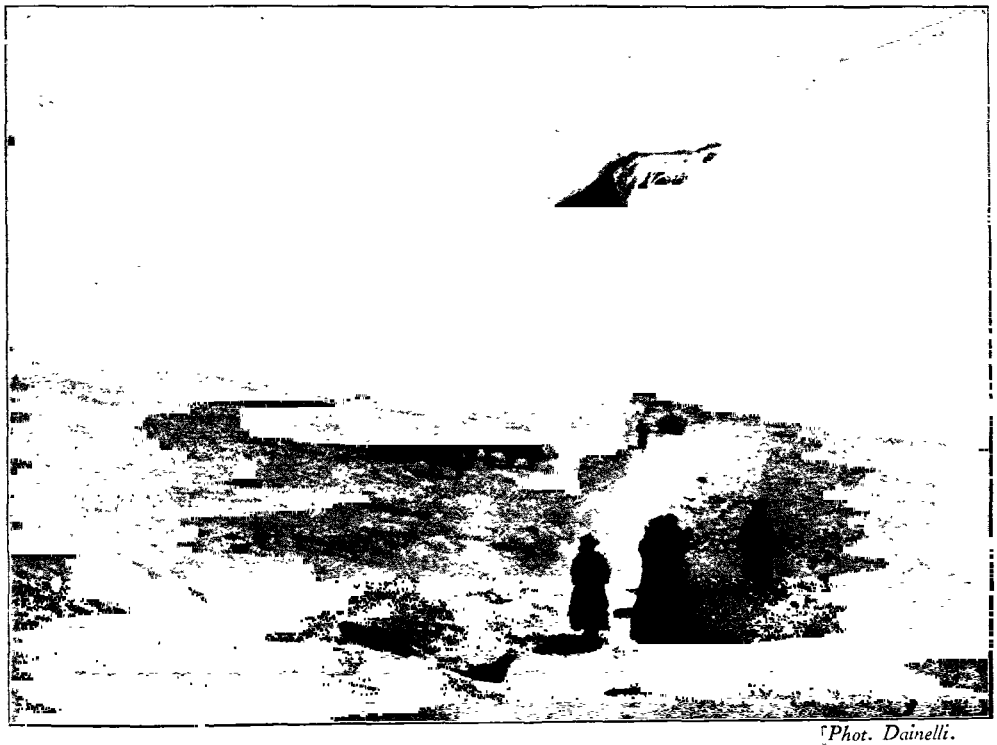
Glaciers, in fact, are the essential factor in the agricultural economy of the region. And the natives know this so well, that they employ that inventiveness which is always born of necessity to build artificial glaciers. It is the Baltis who have this surprising skill: when there is a delta which cannot be cultivated for lack of permanent water supply, they study the topographical conditions of the side valley, and if these are favourable, they will labour patiently for many years to construct, quite high up and in a sheltered spot, a huge system of refrigeration, by means of which the winter snows do not melt rapidly in the spring, but only by degrees during the summer and autumn up to the next snowfall. I have known of several of these artificial glaciers which have been working for the past forty years.

From Leh, then, I continued to ascend the valley of the Indus. The first stretch of it, up to the mouth of the side valley that descends from the Takalung-la, is traversed by the few caravans which travel direct from Leh to Simla. But I think very few travellers have gone much farther up the Indus, with the exception of two or three about the middle of the last century. The information which they have left us about the region is scanty. Yet it is a very interesting region.

The Indus valley is here even more wild and forbidding than in the gorges inhabited by the Dards. But the scene is a similar one, for here too the valley is a great furrow cut in a granite mass. It has a name of its own, Rong, little known, as is the valley itself. But while it had been winter among the Dards, and I could move with ease on the frozen Indus, up here the temperature was already spring-like, and the uniform sheet of ice had melted almost everywhere, leaving only two fringes along the banks. Only once did I find an ice-bridge; a stroke of luck, as otherwise I should have been forced to ford the river by night.

Sometimes, where the valley was narrowest, I had to climb high up the mountain slope by paths so rough and precipitous that the use of animals there would be quite out of the question—even after experience in valleys like the Shayok, where paths are more imaginary than real.

The wildness of the valley is emphasized as the villages become fewer and poorer, with an even smaller number of houses. And as it gets higher and higher the trees gradually disappear; this of course adds to the barrenness of the scene. The contrast

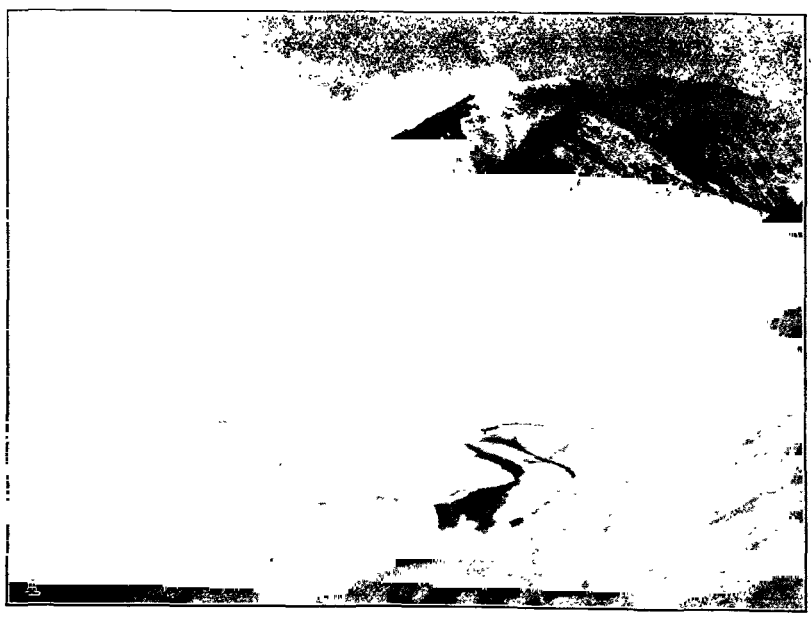


[*Phot. Dainelli.*

Yak caravan in the Rong valley.

with Baltistan is certainly great: there one may say that the oases are perfect bowers, due to the apricot-trees which are the principal harvest of the country, and to the poplars and willows—of these there are few, but enough to build the houses and make agricultural implements. But as you pass from Baltistan to the Dard district of the Indus, the apricot-trees become rarer and smaller, and even more so when you enter Ladak at Kalatse; until, as you go farther east, they disappear entirely. The upper valley of the Indus, in Ladak, has not one to show; there are only the few poplars and willows, planted for the needs of the village; for the country produces of itself no trees, scarcely even any shrub.

Beyond the narrow gorge of the Rong, cut into the granite rock, the granite gives way to clay schists such as I had seen in Purig and western Ladak. The valley widens more and more, it becomes very broad and the scene more and more grandiose. Indeed this extreme eastern portion of the Indus valley in Ladak makes a very strange impression: the higher one climbs, the broader it grows in its lines, instead of smaller and more narrow as is usually the case. The bottom is so level that one is not sure at first sight which way the river flows; indeed, when the wind sprang up, and crisped it into little waves it seemed to flow in the other direction. And the mountains, all of which are 16,000 and many 20,000 feet high, look like modest heights rising from a plain, so



[*Phot. Dainelli.*

In the Rong valley.

high and so vast is the valley bottom itself. I had, in fact, come far enough eastward to be nearly on the threshold of the Tibetan plateaux: and the valleys are nothing but immense troughs cut into these.

Moreover, the old Indian map itself, however conventional in its plan, shows to the practised eye that true isolated blocks of plateaux are preserved on both sides of the wide Indus valley. One must imagine that in geological times not even excessively ancient the great Tibetan plateaux were all one with those of Pamir. Only the constant erosive action of streams at the edges of this gigantic roof of the world has gradually penetrated and cut into it, determining the formation of valley systems and mountain ranges, in the midst of which still linger here and there portions of the primitive plateau.

Such is the fine tableland of Deosai, south of Skardu, and the same is typically the case up here, on both sides of the upper Indus valley in Ladak; plateau-remnants on the right of the river, small, but unmistakably recognizable by the presence of several lakes, in little basins shut in among the highest peaks and ridges; larger ones on the left side, constituting the plateaux of Rupshu which were one of the principal goals of my excursion.

The way thither was by the Takalung-la. But what I heard about the state of

[*Phot. Dainelli.*

The upper Indus near Chumathang.

the snow made me go farther up the Indus in search of a more practicable pass. I arrived at Chumathang, the last Ladaki village in the valley; and thence I climbed up the left-hand slope as far as the old amphitheatre of Sildat, where I spent the night under more primitive conditions than ever before, in a little shepherd's hut, with no way of closing the great cracks in the rude masonry; my fire was made of moist and steaming yak's dung; the temperature was perhaps 10° below zero, the elevation some 16,000 feet, with a bitter wind blowing. The men and the animals spent the night outside on the snow.

From Sildat I reached the Puga valley—and the warmth of its springs. Here I

was at the edge of the plateau. I went up first to the basin of Salt Lake, then to the Tso Moriri, by far the largest lake of the region.

Rupshu is like a great flat-topped block, with minor elevations enclosing basins without any outlets. Each of these is occupied by a salt lake—or, more often, by two communicating lakes, the first of fresh water, the second salt because it has no outlet. All round the enclosed basins are great terraces, showing that the level of the lakes was once much higher than at present, high enough to allow an outflow over the thresholds now existing between one lake and another, or toward the nearest network of rivers on one slope or other of the Himalayas.

My principal task on the Rupshu plateau and its basins was to reconstruct the hydrographic conditions of the past by the observation of present morphological and altimetric conditions, and of the great lacustrine and alluvial deposits. The resulting picture was truly suggestive: the history of each basin blended into the common history of them all. And the formation of each lake, of each elevation, the gradual drying out, the phenomena of the arrest of the waters, which of necessity all seem wonderful to our eye, accustomed as it is to the apparent stability of the landscape, all took place in a space of time which is but a moment in geological history.

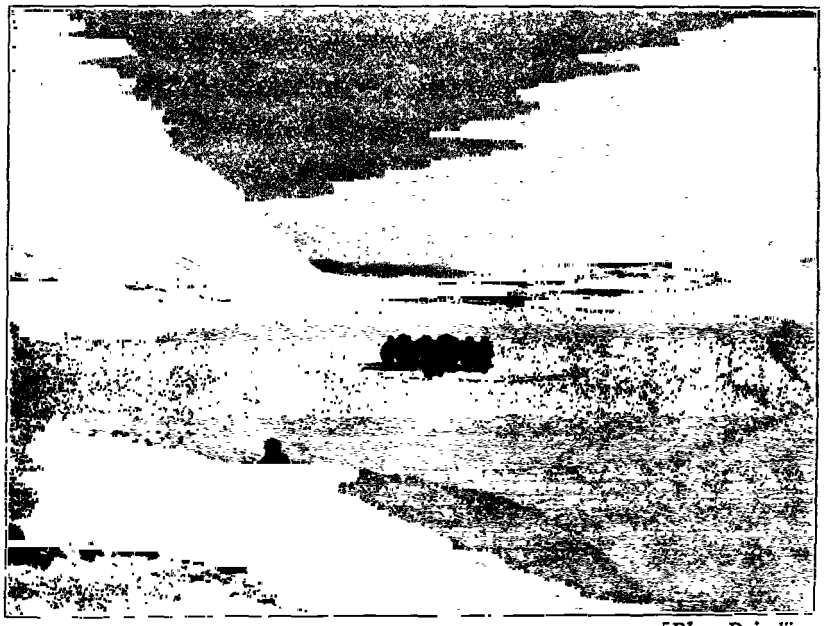
My worst day, as far as weather is concerned, was the day I reached the Tso Moriri. The storm raged furiously, the men were like scattered dots on that waste of snow, under the blinding scourge. My little caravan advanced slowly and hesitatingly; I took the lead and by the aid of a natural sense of direction we reached the wide expanse of frozen lake and thence went on to our goal, the *gonpa* of Garzok.

Here we were detained two days by a storm which ended by knocking down a wall of the monastery and made me watch anxiously the roof of the poor little room in which the lama had lodged me.

I profited by the delay to put my notes and collections in order, which I had not been able to do in the preceding uncomfortable days; and I had the opportunity of seeing the inner life of a Tibetan monastery.

Garzok is, I believe, one of the highest permanently inhabited places in the world. Yet it is in a way *sui generis*: it cannot be called a proper oasis, in which man is closely bound to the soil and the cultivation of it. The little centre of population is here represented by the monastery itself; and monasteries, we know, do not always follow the laws of normal collective life among human beings, because they have other requirements and resources. Often indeed they seem to seek out spots which would seem the least suitable and propitious to a human settlement. Always and everywhere there has been the search for solitude and inaccessibility, which surrounds these voluntary exiles with an aureole of sanctity. A *gonpa*, then, by reason of its exceptional character, is no criterion by which to judge the altimetric limits of human habitation; any more than is a settlement which has been called into being as a temporary market or to exploit mineral resources.

However, a small population has sprung up round Garzok, which, although it lives on and from the monastery, is, after all, a lay population, and thus may develop into a normal and proper human settlement. A few families of Changpa shepherds have permanently set up their tents round the monastery. The phenomenon is the more striking in that these are people who have always been nomads, and still keep to their typical form of habitation, namely the tent. And moreover, there is already a small cultivated area round the *gonpa*, though the soil at that height is, of course, not very productive.

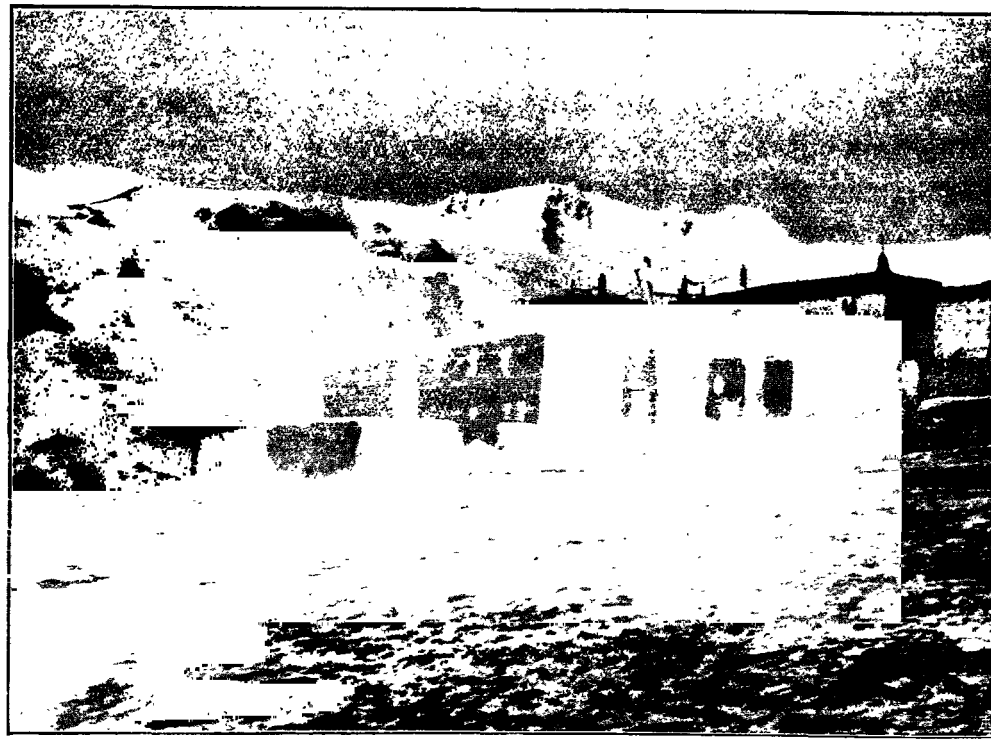


[*Phot. Dainelli.*

The frozen surface of the Tso Moriri.

Garzok is a poor monastery, with none of the outward impressiveness or richness of interior displayed in other establishments between Lamayuru and Leh or in those I afterwards saw between Leh and Chimre; all of which are in more populous and richer regions, and are usually foundations established a long time back; even despite the depredations of the Dogra conquerors they still hold the land and in part the treasures which were the result of donations from the faithful throughout whole centuries. Garzok lies in a district uninhabited for the greater part of the year, and in the summer occupied by shepherds whose only wealth is their flocks, and who are of course recent comers. Hence the small buildings, the poor temples, the impoverished lives of the lamas—though to enhance the holiness of the place, there is a *kushok*, or reincarnated abbot, who came here from Lhasa as a boy.

Undoubtedly the plateau must look very different in the summer, when it is peopled with the Changpa shepherds and their tents. There must be a great many of them, to judge by the number of fire-places and stone circles which form the enclosures for the kids at night. These circles—which with the fire-places are the invariable sign of a nomad settlement—are interesting in themselves, because they are called *le* : one wonders if this might be the origin of the name of the capital of Ladak, going back to a time when the Ladakis, like the Changpas to-day, were still shepherds instead of farmers



[*Phot. Dainelli.*

The *gonpa* of Garzok.

with a fixed abode. What I saw at Garzok represented a stage in the gradual progress of a people toward civilization ; some peoples have reached it at a more or less remote period, others only recently, and others have not yet arrived at it. Wherever nomadism still exists, there will be found some locality—on the edge of an agricultural population —where the process is still going on. In the course of my excursion I was actually able to observe it.

Nomadism may have various forms. Essentially it may be either wandering or oscillating. The Punjab shepherds who move slowly every spring from the Indian

plain to Kashmir to feed their flocks for the summer on the Deosai plateau near Skardu, returning by the same way when autumn comes, are like the endless beat of a pendulum. But other nomads live permanently within certain limits, not going beyond these but also lacking any special plan save to make the best use of pastures and water. The Changpas represent an intermediate form: in winter nearly all of them gather in the so-called Kakium, a tract of the wide Indus valley almost on the Tibetan border; in summer they are scattered all over the higher region from the Rupshu plateau on the south to the valley of the Chang Chenmo on the north; but they move about perpetually in this zone, to take the best advantage of the meagre pasture.

[*Phot. Dainelli.*

A *rebo*, or Changpa tent.

Lack of time prevented me—much against my will—from visiting the Changpas in their winter seat in the Kakium. But apart from those settled in their tents round the monastery of Garzok I saw others here and there in their winter camps at the bottom of the valleys, awaiting the summer move to higher regions.

The *rebo*—the Changpa tent—is very characteristic: made of a coarse chestnut-coloured homespun stuff of yak's hair, oval in shape, with an opening at the top corresponding to the shorter axis and an entrance on the same side. Inside in a row, are the primitive fire-place, the store of goat's dung fuel and a poor little altar with a statuette of Buddha and a lighted wick or so. On either side of these are the sleeping-places and household goods. The tent, which looks from above like half an egg, is held up

by cords attached to upright poles. It can be set up and taken down very quickly, and carried on the back of a single yak. I tried one, and I must say that the *rebo* is even more comfortable than the so-called tropical tent—only next time I shall see that it is thoroughly cleaned before I take possession.

Crossing the border zone between the Ladakis and the Changpas I had opportunity to observe the phenomena of transition in its various stages. These can be recognized in the gradual change in the dwellings—though the actual change takes place, one may say, in the moment when the nomad sets up his tent for the last time and does not take it down. Once having done this, the owner naturally tries to make it more stable and more comfortable: gradually a row of stones gets laid around the edge, to hold it and to prevent the wind from entering. Later these rows of stones become a little wall, above which the canvas dome still rises.

Then slowly the upright poles or the ropes begin to wear out and are not replaced; instead, the cords of the canvas are fastened to the wall, making it higher and firmer for the purpose; at last comes the moment when the canvas is done away with and a roof put in its place. The inside arrangements remain the same, with the entrance in the middle of the long side, and the fire-place, the store of fuel and the little altar in a row down the middle. It is now a full-fledged house; and in these surroundings it will not alter very much, though the owner may build additions on one side or the other, to be used as stable or storehouse.

All of these stages I saw, while *en route* between the Rupshu plateau and Lake Pangkong; in the heart of the Changpa territory, where the Ladaki influence is accordingly less direct. On the margin, however, where the nomad settlements date from a relatively distant time, the inside arrangement of the house has lost the primitive *rebo* character. But though it may have taken on some of the external characteristics of the Ladaki house, such as the terraces and the jutting balconies, it remains more irregular in plan, and never displays the division into winter and summer quarters. And the changes in the family life come about as gradually as the changes in the house. The fixing of the abode coincides, naturally, with the cultivation of the first field, while the breeding of animals goes on, though on a lesser and decreasing scale; and part of the family, at least, still goes up to the high pastures in summer with the yaks and goats, which after all are everything to the nomad, and cannot be replaced all at once by the meagre crops of a land close to 16,000 feet above sea-level. The herds provide not only sustenance, but means of transport—you still see transport-caravans made up entirely of goats—they supply material for weaving and cord-making, and lastly they have long produced a valuable article of commerce, the *pashmina*, the soft fine wool under the hair of the goat, which is exported for the weaving of the famous cashmere shawls.

These Changpas have definite Mongol characteristics which distinguish them from the Ladakis; but my observation of nomads of the neighbouring territory of

Tibet and of inhabitants of Lhasa, leads me to think that the Mongol characteristics grow stronger as one goes farther east. Moreover, the Changpas differ from the Ladakis in their wardrobe, although there are many elements of similarity. The Ladakis wear short boots, adding strips of felt twisted round the leg, whereas the Changpa boots reach the knee. They differ too in the way they wear the big tunic of white cloth, closed by a sash round the waist; the Changpas have their tunic bloused above the waist, so that it only reaches to the calf, while the Ladakis comes down to the ankle. The women display special differences, particularly in the head-dress and its ornaments.

[*Phot. Dainelli.*

Changpa shepherds near the Tsaka-la.

I left the upper valley of the Indus to get to Lake Pangkong, passing from one basin to the other by the Tsaka-la, a very wide and low pass.

Each day of my march gave me a surprise—and I had one on the Tsaka-la. It is not only very low—perhaps 1,000 feet above the Indus valley—but it is encumbered with large morainic accumulations. Were these removed, the actual level of the pass would be lower still. It is clear that before the glacial period the upper Indus ran toward what is now one of its affluents, the Shayok; while the Indus of Ladak was only fed by the Rupshu plateau. The unequal erosion of the great quaternary glaciers has been the cause of the present hydrography. I cannot go into more detail here; I can only say that all the morphological characteristics of this interesting region are those of a plateau which has been subjected to powerful glacial action. Farther west, for example

in Baltistan, the glaciers of the past found channels for their ice masses within deep valleys already formed, whereas here they almost obliterated the superficial topography, gradually scooping out the valleys as we see them to-day from pre-existent superficial furrows of the great plateau. Their irregular action—irregular, that is, compared to that of the action of running water—dug out counter-slopes, which have brought about the frequent inversion in the course of the rivers and the formation of enclosed basins, which now contain great lakes.

Another surprise on my way to the Tsaka-la was the discovery of traces of fossils—a real rarity. And after I had crossed the pass, and had a little spare time, I was seized

[*Phot. Dainelli.*

Crossing the Tsaka-la.

with the idea of going up a little valley which really promised nothing in particular, and found it full of fossils. It had always been believed that these terrains were, geologically speaking, very old, to be precise that they antedated the Carboniferous era, but the fossils I discovered bear witness to an age which is almost recent.

That evening I returned well satisfied to camp—a camp, as usual, without tents. It was at Shushal, and I slept in a half-ruined house belonging to the government. There are a number of these along the border, they may serve for something like custom-houses, to control and supervise the movement of trade. They were built when labour cost the government nothing, being a form of tribute levied on the population. Now they are empty and abandoned, often in ruins; but for me they proved a great con-

venience more than once, saving me from having to turn some family out of its house that I might lodge there for a night.

Shushal is a small hamlet with a few scattered houses of Changpas who have settled and become farmers. It has its own *gonpa*. I had seen another after Garzok, at Nima, in the Indus valley, in the typical position on the top of an isolated rock in the midst of the alluvial plain, surrounded by the ruined walls and towers of the ancient feudal castle. The feudalism of Ladak had penetrated thus far. Indeed, even in the Rong, that gorge of the Indus which lacks all trace of any village, I found remains, almost inaccessible, of fortifications, built perhaps as a protection against the raids of nomads from the plateaux. To-day there are no raids; if anyone were to penetrate into the plateaux and find Changpas belonging to the Tibetan territory, the most the latter would do would be to bring him back to the border. Later on, I was on those plateaux myself, but I saw nothing but herds of gazelle, which did not contest my passage.

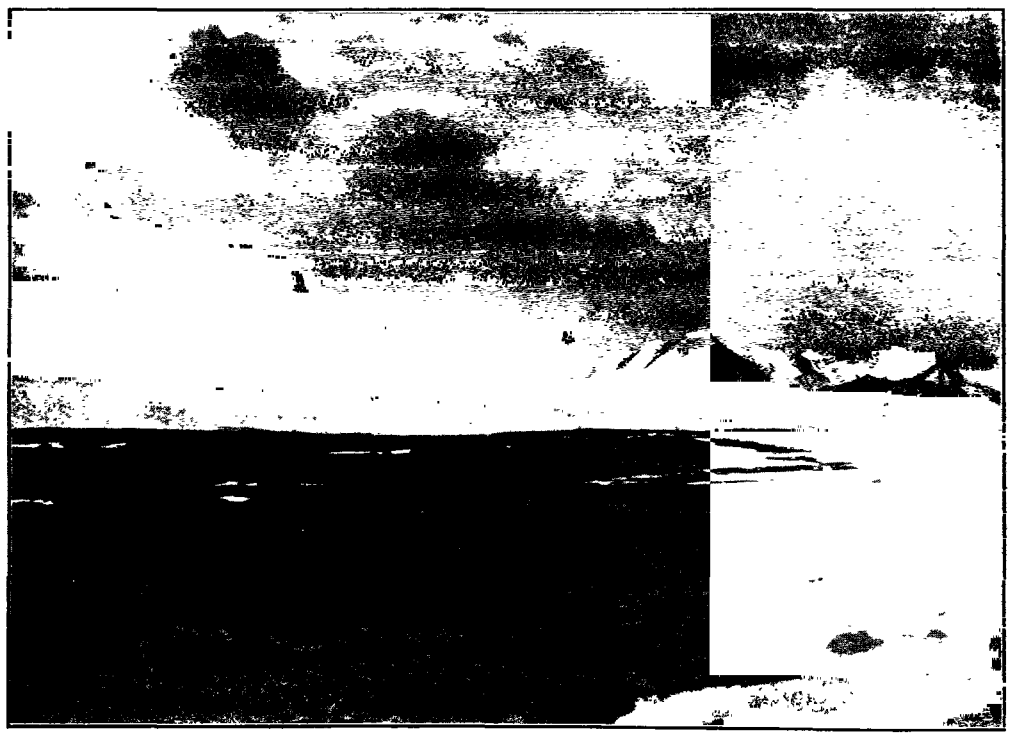
There was a feast day in the *gonpa* of Shushal, and Changpas had come to it from all the region round. I took the occasion to get a series of measurements such as I already had for all the other populations of the Indus basin. They were celebrating the same solemn feast I had witnessed in the large monastery of Phayang; but here it was not so grand, for there were only a few lamas. The *mise en scène*, so to speak, was much reduced, though the action was the same. The dancers were not many, but there were the masked lamas at whom I had marvelled in the great *tamasha* at Phayang, and they entertained the public with the same kind of occasionally *risqué* buffoonery. There were also the profane amusements: horse-racing, and in the evening, interminable dancing.

The superior of the monastery of Phayang was here on a visit and I was able by a little diplomacy to obtain possession of a delightful incense-burner which I had coveted in far-away Phayang. In addition to which occupations I was able to collect some more place names.

A few hours' march from Shushal brought me to the shores of the Pangkong. However much experience one may have of lakes and lacustrine basins, one cannot fail to be surprised at the first sight of this strange Tibetan lake. Two or three miles broad, it may be 40 or 50 long. You get an impression not so much of a lake as of a deep, narrow valley which has been unexpectedly flooded. One thinks at once of the fiords of Norway, both for the winding blue ribbon of water and the precipitous rocks above it. And in fact, there is much reason for the similarity, since the determining cause is the same: the morphological agency has been the mighty glaciers of a past epoch.

The few travellers who had preceded me to the shores of the Pangkong had all asked themselves the origin of this strange lake winding among the mountain spurs that come down from the edge of the Tibetan plateaux. At the western end at a place called Yaktil the wall of rocks which encloses it is interrupted by a valley: but not,

as often happens elsewhere, a valley which inclines toward the lake and empties its waters into it, but one which slopes toward the nearest basin of Tankse and then toward the Shayok. Here must once have flowed the river from the pre-lacustrine basin of Pangkong. Upon this there is general agreement. But how was the lake formed? Previous travellers seem to agree upon the answer to this question: almost all of them say that at the present head of the valley that goes down to the Tankse a lateral torrent must



[*Phot. Dainelli*

On the banks of the frozen Pangkong.

have brought down enough alluvial matter to have dammed up the stream and caused the formation of the lake.

But there is no trace of the supposed alluvions; the valley, at its beginning, is cut in the rock, and there has never been any dam. Indeed, one can see at Yaktil that the shore of the lake is cut into a canal, now dry, which issues in the valley toward Tankse and was evidently once the channel of an outlet of the lake.

Now from the state of the mouth of the former outlet there seems to be no doubt that the Pangkong owes its origin not to the damming-up, but to the super-excavation of a stretch of the ancient valley, determining a counter-slope which can be due to no other cause than the mighty glaciers of the glacial period. Once the glaciers retreated,

the counter-slope gave birth to the lake, with outlet. Only later, with drier climatic conditions, the level of the lake dropped, the outlet dried up and the lake became salt.

All round the banks are lacustrine terraces—they even contain shells—which bear witness to the maximum height of the water and the stages of its decline to its present level; my observations have enabled me to fix the period of each of these levels and of the drying-up of the outlet, and thus to reconstruct an interesting chapter in the history of the region.

Following the southern shore of the Pangkong toward Yaktil I set my feet in the direction of Leh: entered the valley of the former outlet and in two short stages issued from it in the Tankse basin.

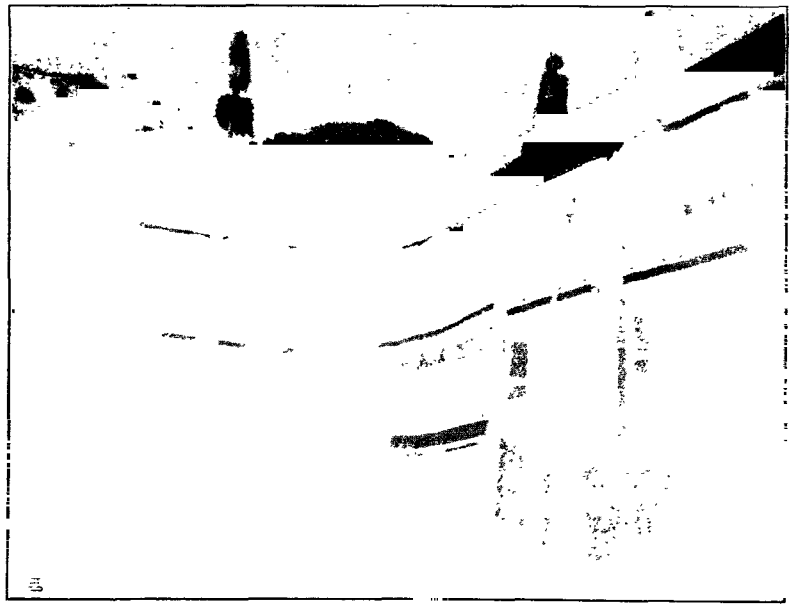
This, it seemed clear to me, must have been in the past the course of the Indus, before it found its present bed; and here large moraines and great deposits of clay between the steep slopes of granite, marble and crystalline schists told me the late and the early geological history of the region. Changpa villages, the last I should meet with along my way, invited me to frequent pauses to complete my measurements and make my investigations.

From the Tankse basin I proceeded to ascend the northern valley of the Chang-la, which after a few hours' climb brought me to a landscape wrapped in winter. All the mountains were covered with a uniform mantle of snow—so deep that I did not know I had crossed one or two little lakes—and more snow fell, accompanied by wind. Half-way up I stopped to camp; but the caravan with the tents was late in coming up and I was glad of the poor shelter afforded by a rock where three Ladakis had already taken refuge and were having their tea and *satu* by a little fire of yak's dung. There was not much room in the cave, where we all had to stand back to back bent over in order not to knock our heads against the roof. But it seemed a palace, while the storm raged without. When the tents arrived, in the evening, there was nothing for me to do but to get inside my sleeping-bag, lamenting bitterly that I had not a Ladaki house or even a Changpa *rebo* at my disposal.

Next day I crossed the Chang-la; there was so much snow that the great pyramid of stones (*lhato*) at the summit of the pass was buried, save for the flag at the top. The descent on the south side was rapid; in a few hours I was below the snow and in an atmosphere of spring. The whole population was at work in the fields at Sakti, where I stopped.

Once more I was back in typical Ladaki surroundings. The villages succeeded each other in the valley, with endless orderly terraced fields. One spur, then another, showed a crest of masonry and the towers of some ancient feudal castle. Farther down was a forest of *chortens*, then the enormous picturesque mass of the *gonpa* of Chimre, spreading its temples and the houses of its hundreds and hundreds of lamas down the steep mountain-side. My road, however, went on along the valley, and at last I came out once more upon the Indus.

I could have reached Leh in a stage and a half; but my programme was not yet completed. I looked for a ford and crossed the Indus and went up a side valley, very narrow and winding, to the *gonpa* of Himis. It is the largest and richest in the region, perhaps the most talked about in descriptions of Ladak. And for that reason, I may be excused from describing it; save to say that though it is the only one to have preserved its treasures of gold and silver and precious stones from the Dogra invaders, and though it possesses more and larger temples, yet almost all of the others surpass it in beauty of situation—Lamayuru, Rigzon, Likir, Phayang, Spituk, Tikse, Chimre,



[*Phot. Dainelli.*

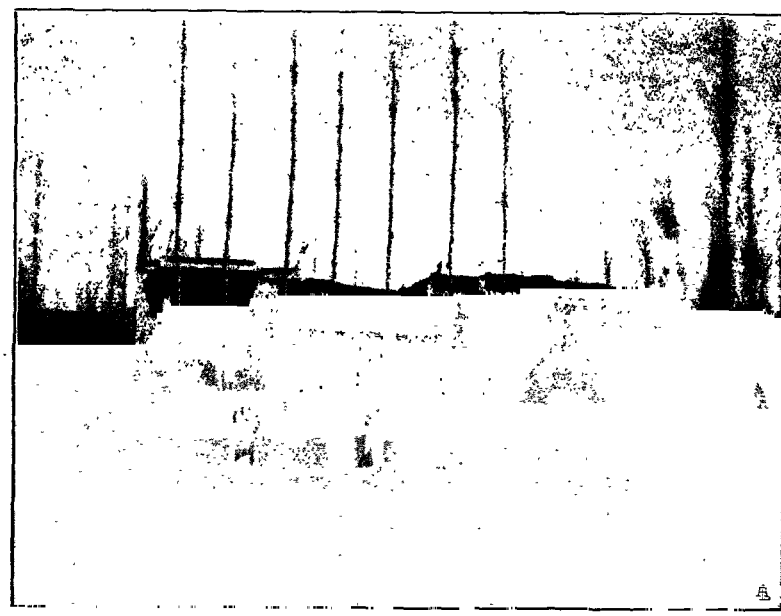
In the monastery of Himis.

Stakna—I mention only those I have visited. But still, one would not like to be in Ladak without seeing Himis.

I spent the night there and set out early, the more readily because of the absence of the abbot, with whom I had already had some dealings while I was at Leh for the purpose of getting possession of a beautiful copper teapot with gold and silver arabesque work. I went on toward Leh, stopping to visit the monastery of Stakna, which dominates the valley from a high isolated rock in the centre of the alluvial plain. I spent the night at Shushot, the interesting site of a colony of Balti farmers. It was almost as though I sought to delay the hour of my return, for I turned off toward the oasis of Stok, which is all that remains to-day of the domains of the ancient dynasty of Ladaki kings. The palace of the *gyalpo* (king) is large and beautiful; typically

Tibetan in its architecture, similar to, though a little smaller than, the ancient royal palace above Leh. It was a feast day—in Ladak it is always like a feast day everywhere. There was the deposed king with his son; Raspa, the *kushok* of Himis, and Bakula, the *kushok* of Spituk, a great gentleman, great in heart and in bearing—a close friend of mine. There was also a host of lamas, servants and *zemindars* (farmers); the large bowls of *chang*, the peasants' beer, were quickly emptied.

I returned to Leh with the *kushok* of Himis, in a train of lamas and dignitaries of his suite, a fantastic procession.



[*Phot. Dainelli.*

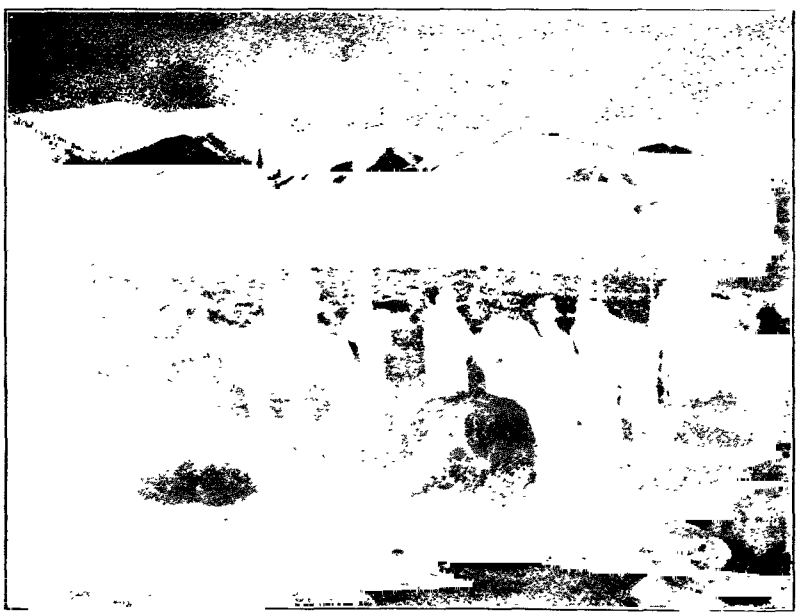
Farmer's house, Shushot.

I came back well satisfied with my long tour to the borders of Tibet, which had raised so many interesting geological and morphological problems and brought me into contact with new populations. I needed time to arrange my notes and collections, and this I had, yet not enough, for I had made friends with the inhabitants and many hours were taken up—agreeably and profitably—with entertainments and dinners which—in such surroundings as these—were always most rewarding.

But my time was short. My friend the *wazir*, who had arrived at Leh in the meantime, knew that I was going in search of shells in the rocks, in other words fossils—and he was as ever prompt to second or even to forestall my wishes, scientific as well as others. He himself had never seen any fossils, but so convinced was he of the importance which I attached to finding them, that without saying a word he began investi-

gations among the natives. When I came back to Leh, he presented me, in triumph, with a box full of fossils. He got them from a native of Rumbok (Rumpak), a village on the other side of the Indus, on one of the few roads which lead to the basin of Zanskar. There was no doubt but that I must go to Rumbok.

In the meantime, four new members of the expedition were daily expected, among them my colleague Marinelli, who would certainly relieve me of at least half of the heavy burden of my multifarious labours. I waited for him, of course, but scarcely had he arrived—for the time was approaching when the whole party was to leave on its summer



[*Phot. Dainelli.*

Returning to Leh, with the *kushok* of Himis.

campaign of exploration—when we were off on a short excursion (May 1st to 6th) in the Rumbok valley to look for fossils and as far as the Zanskar basin, to survey a new section across formations relatively not old, whose outcropping follows the valley of the Indus from Kalatse to near the Rupshu plateau.

It was a most fruitful excursion. Fortune was with us. For we found, indeed, not a sign of fossils like those Hashmatullah Khan had given me—nor did I expect any —but many others, though in an imperfect state of preservation, and made a large collection. It was an important find. The scientific literature of the subject mentions, rather vaguely, the discovery of a fossil of about the same age as many of the specimens we found, in a spot not very far distant. But the rocks there are such as to preclude the possibility of finding any such fossils. Here then was a sort of geological puzzle,

unexplainable except by supposing there had been a confusion of labels, as must have happened with the pretended fossils from the neighbourhood of Shigar, where I spent much time searching for them in vain.

The difficulty of penetrating the whole Zanskar region is well known. It is identified with the basin of the river of the same name, the principal tributary on the left of the Indus. The Rumbok valley, rough as it is and without any real path, is perhaps the easiest way into the Zanskar basin. And once inside matters were even worse; even our short experience made us understand its reputation perfectly.

To look for fossils means to walk slowly, with eyes fixed on the ground; to go up the side valleys and lateral ravines; to make a detailed survey to connect up all the fossiliferous outcroppings; then, during whole evenings, to wrap up with the greatest care our precious finds.

We crossed the Shing-la, still snow-covered, and descended the other side into the Zanskar basin toward the village of Skio, where there is a flourishing little local industry of copper articles. It is wonderful to see the swiftness and skill with which these people work, and the simplicity of their primitive tools. I wanted to order a teapot: one of those beautiful copper ones with the handle and spout in the shape of dragons, finely worked, the lid having a conventionalized lotus blossom on top. They asked four days' time. I agreed to two and offered a few rupees more. When I came back to Skio in two days the teapot was ready and the money had been well earned.

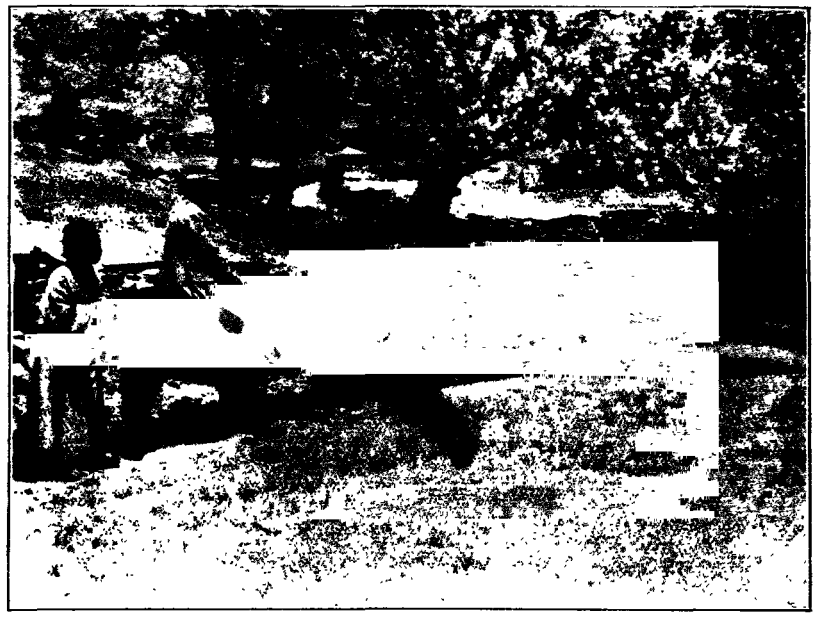
We pressed on to Chiling, on the left bank of the Zanskar, always with the same geological programme in view. But it may interest those who would like to know what unforeseen obstacles may be encountered in those regions to hear how much time we lost before we got across the Zanskar.

The river ran far down in a narrow, rocky gorge, deep and full of whirlpools. There was no bridge, not even the characteristic *jula* one which makes the head go round with its swaying, but is a real godsend to the traveller. We could not ford, and there was no village near. We sent a man along the rocks on the right side to a point opposite Chiling, whence he could shout to the natives and tell them we wanted to cross. It took some time, before a little troop of men, with three short tree-trunks and many cords, arrived opposite the spot where we were waiting. After many efforts we succeeded in throwing them a small cord, and then a stouter one; a little raft was improvised with the tree-trunks, and drawn to and fro from one bank to the other by means of two ropes, each time carrying one of us and one of our bundles.

Chiling was a surprise. In this rocky valley bottom the air was warmer and quieter than elsewhere. The spring was much more advanced than at Leh, where it had snowed until the last few days. At Chiling all the apricot-trees were in full bloom—a wonderful sight. There was another surprise, not so pleasant, though it too was due to the

first warmth of the spring: we had a tremendous night, because the spring awakening was not only in the flora but in the fauna, the small domestic fauna of the house where we lodged.

We made some short trips in the vicinity, re-crossed the river by the improvised ferry, took possession of my teapot at Skio, once more climbed the Shing-la, collected



[*Phot. Danielli.*

Apricot-trees in blossom at Chiling in the Zanskar valley.

more fossils in the Rumbok valley and then returned to Leh: here too a week had been enough to clothe the apricot-trees in white.

We were now on the eve of departure; fortunately it was delayed by a week. We surveyed the large moraine of Zunglas in detail, put in order all the collections that had been made since we left Skardu, and packed them in boxes ready to be sent to Italy. We had also to make arrangements for the second half of our undertaking: as it would be carried out for the most part in uninhabited regions, we needed to make sure that our personal luggage included all the necessaries and the necessaries only.

CHAPTER IX

FROM LEH TO THE DEPSANG PLATEAU

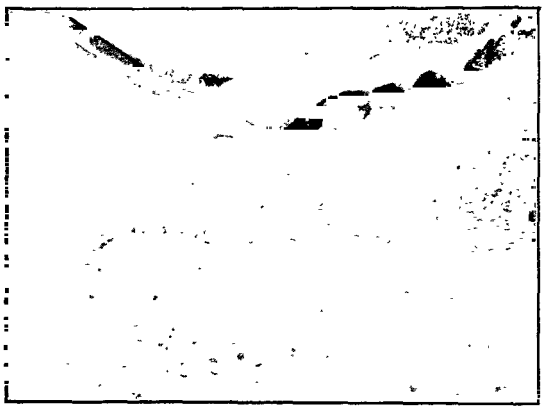
The passes of the Ladak range from the Indus to the Shayok, and the routes between Leh and the Karakoram—The new road by the Shayok valley—Crossing the Chang-la—The village of Shayok—Stages and camps on the way up the Shayok—Murgo—Ascent to the Depsang plateau—Kisil Lungur.

BETWEEN the Karakoram and that part of the Indus valley which runs obliquely across the whole length of Ladak, there lies a mountainous zone more than 90 miles wide, traversed by the Shayok valley and by its tributary the Nubra. These rivers have their source in the Rimu and the Siachen, great glaciers of the Karakoram, and flow southward almost parallel to each other; then the Shayok bends abruptly northwest, to its confluence with the Nubra, after which it runs parallel to the Indus as far as Kiris in Baltistan, near the Skardu basin, where the two rivers unite.

A great chain, with peaks from 20,000 to 23,000 feet high—the so-called Ladak range [1]—divides the

[1] It is so called by the Indian Trigonometrical Survey (see S. G. Burrard and H. H. Hayden, *A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet*; Calcutta, 1907–8). Cunningham (*op. cit.*, p. 50) calls it the Kailas or Gangri chain; Sven Hedin (*op. cit.*, Vol. II, pp. 407 *sqq.*) considers it a branch of his Trans-Himalaya.

Indus valley from the Shayok. But few passes cross it and they are high and difficult, over 16,000 feet. Two are below Leh, and seldom used—they do not interest us here. Of the others, the most used is the Kardong-la,[1] 17,600 feet high, at the summit of the valley of Leh; the Laswan-la—also called the Sobu- or Digger-la, from the names of two places on the way up and down—at the top of the next valley to Leh; and the Chang-la, 18,370 feet high, at the top of the Chimre valley, still farther above Leh. Other passes, not so high, in the south-east prolongation of the Ladak range, lead to the basin of Lake Pangkong and do not concern our route.



The Kardong-la from the north.

By the Kardong-la and the Laswan-la you reach the Shayok near its confluence with the Nubra; the Chang-la leads to the northern end of the basin occupied by Lake Pangkong, and also to the village of Shayok, close to the point where the river coming from the north makes its great bend north-west, in the direction of the mouth of the Nubra. These three passes correspond to the caravan routes used at various times between Leh and Central Asia. Far and away the most frequented in recent times is the route which crosses the Ladak range by the Kardong-la, ascends a good distance into the Nubra valley and then leaves it for the Shayok, which it reaches about 35 miles below its source, crossing the mountain range between the two rivers by the Sassir pass, 17,600 feet high and covered with glaciers.

The glaciers of the Sassir-la.

The second route leaves the Indus by the Chimre valley and crosses the Chang-la; ascending the Shayok valley until it joins the Sassir route, and proceeds to the Karakoram pass (18,290 feet). There is a third way, which also crosses the Chang-la, then proceeds east of the Shayok to the Marsimik-la (18,400 feet) between the basins of Lake Pangkong and the Chang Chenmo river, and finally crosses the Chang Lung-la (19,280 feet) between the Chang

[1] Laowchi pass, on the map of the Indian Atlas.

Chenmo and the plateaux of Lingzi-Thang and Aksai-Chin. Traversing these always at a height of over 16,000 feet, it descends into the Kara-Kash valley, running into Eastern Turkestan.

The political vicissitudes of Central Asia, the succession of upheavals within and invasions from without, made it inaccessible to foreigners up to the second half of the last century; only at long intervals could one get geographical information on the routes that led thither from India, across the vast mountain ranges barring the way. We have seen that Moorcroft spent two years at Leh without getting permission to enter Turkestan. Nevertheless, he made an excursion in the Nubra valley, crossing the Ladak range by the Laswan-la and coming back by the Kardong-la. In late autumn of the same year he crossed again, this time by the Chang-la, already shrouded in deep snow. He and Trebeck visited Lake Pangkong, whence they returned to the Indus by separate ways: Moorcroft by the Tato-la, at the northern end of the lake, Trebeck by the Chang-la, on December 9th.[1] Fifteen years later Vigne reached the Nubra valley, using in all probability the Kardong and Laswan passes.[2]

Only in 1848 did a European, Dr. Thomson, succeed in reaching the famous Karakoram pass. The year before he had crossed from the Indus valley into the Shayok by the Laswan-la, and followed down the latter valley to its confluence with the Indus. In 1848 he returned to Leh, reached Nubra by the Kardong-la and proceeded as far as the Karakoram pass; he gives us the first detailed description of this route.[3] In July of 1856, Hermann and Robert von Schlagintweit reached the Karakoram pass by the same route, and were the first Europeans to cross it, on their way to Khotan. The next year the third brother, Adolf, went by the way of the Chang Chenmo and the plateaux, descending into Turkestan and penetrating as far as the gates of Kashgar, where he fell victim to that fanatical soldier of fortune, Wali Khan.[4]

Thus it is obvious that journeys to Turkestan have so far been few and far between. Eight years after Schlagintweit (in 1864), W. H. Johnson, of the Indian Trigonometrical Survey, later in the employ of the Maharajah of Kashmir, explored the Lingzi-Thang plateau, the region of the Karakoram pass and the upper Shayok valley.[5] The next

[1] See Moorcroft, *op. cit.*, Vol. I, pp. 396, 427, 432 and 450.

[2] Vigne, *op. cit.*, pp. 358 and 369. Vigne's description does not make very clear which passes he used.

[3] Thomson, *op. cit.*, pp. 187 and 396.

[4] Schlagintweit, *op. cit.*, Vol. IV, pp. 12 and 229. For the history of the passes of the Ladak range, there should be added here the crossing of the Chang-la by Captain H. H. Godwin Austen in 1863, during a topographical campaign in the Pangkong district (see *Jour. Roy. Geog. Soc.*, Vol. XXXVII, 1867, p. 344). The same year the Indian Trigonometrical Survey sent an Indian topographer to survey the route between Leh and Yarkand, by the Kardong-la and the Nubra valley. He died on his way back, the following year; but the information he gathered was not lost (see T. G. Montgomerie, "On the Geographical Position of Yarkand," etc., *Jour. Roy. Geog. Soc.*, Vol. XXXVI, 1886, pp. 157 *sqq.*).

[5] See the account of this campaign in Vol. VII of the *Synopsis of Results of the Indian Trigonometrical Survey*, p. xxxvii. The pass in the Ladak range crossed by Johnson is not mentioned by name.

year he went back and crossed the ranges to reach Khotan ; going by way of the Chang-la, the Chang Chenmo and the plateaux and returning by the Karakoram pass, the Nubra valley and the Kardong-la. His survey was the basis for the maps of the region round the Karakoram pass, unaltered until our expedition.[1]

Between 1864 and 1867 an adventurer from Western Turkestan named Yakub Beg by a brilliant series of victories made himself master of Kashgar, Yarkand and Khotan, and assumed the title of Atalik Ghazi (Protector of Heroes). Thus for a time Turkestan was free from internecine strife. Robert Shaw and G. W. Hayward profited by the new conditions and were the first to reach Yarkand and Kashgar (in 1886) although they were received with some suspicion. They both travelled by the Chang-la, the Chang Chenmo, the plateaux and the Kara-Kash valley, but independently, one following the other. Hayward also made long excursions off his route, carrying out important explorations in the Kara-Kash valley and the upper Yarkand before he was ready to turn back, in the summer of 1869. He joined Shaw, and the two returned by the Nubra and the Kardong-la.[2] Likewise in the same year, Drew crossed the plateaux east of the Shayok as far as the eastern fork of the Kara-Kash.[3]

The Atalik Ghazi was perhaps induced by the visit of the two Englishmen to try a policy of friendly relations with England ; he was indeed urged to it by his precarious position between the Russian menace on the north and west and the Chinese on the east. However that may be, he decided to ask for an English mission to be sent to conclude a trade agreement between Turkestan and India. The government of India —which, as we have seen, had had its own commissioner at Leh since 1865, to supervise and control trade—gladly assented, and thus originated the two missions of Forsyth, in 1870 and 1873. Both missions, especially the second, were abundantly provided with means, with a staff including orientalists, naturalists, geologists, geodesists and surveyors ; and they profited by the experience and aid of Dr. Cayley, the first English Resident in Ladak. They bore abundant fruit in geographical data and information about Turkestan and the neighbouring regions. The various routes between Leh and Turkestan were crossed and for the first time co-ordinated accounts and exact comparative data became available. [4]

[1] See p. xxxix of the *Synopsis* and the account by Johnson, already cited, in *Jour. Roy. Geog. Soc.*, Vol. XXXVII, 1867, p. 1.

[2] See Shaw, *op. cit.*, Chapter V, pp. 78 *sqq.* and Chapter XVII, pp. 411 *sqq.* ; and the Hayward's account, " Journey from Leh to Yarkand and Kashgar and Exploration of the Sources of the Yarkand River (1868–9) " in *Jour. Roy. Geog. Soc.*, Vol. XL, 1870, pp. 33–166 ; extracts and discussions in *Proc. R.G.S.*, Vol. XIV, 1869, p. 41.

[3] Drew, *op. cit.*, p. 335.

[4] On the Forsyth Missions, see in particular *The Autobiography and Reminiscences of Sir Douglas Forsyth*, ed. by his daughter, London, 1887 ; the *Report of a Mission to Yarkund in 1873*, Calcutta, 1875, by Forsyth, with chapters by the members of the Mission ; T. E. Gordon, *The Roof of the World*, Edinburgh, 1876 ; G. Henderson and Allan O. Hume, *Lahore to Yarkand*, etc., London, 1873 ; W. H.

Of the three routes between Leh and Eastern Turkestan, one—by the Chang Chenmo and the plateaux east of the Shayok valley—was not suited to our purpose because it does not lead to the Eastern Karakoram, where the expedition was to set up geophysical stations and explore the glaciers which are the source of the Shayok. The Chang Chenmo route, moreover, is seldom used by caravans going to or coming from Central Asia, because it is longer and more fatiguing than the others, and crosses extensive deserts over 16,000 feet above sea-level, devoid of vegetation, of fuel, even of drinking water. It is a route which may have been useful at a time when the route by the Karakoram pass was infested by Kunjut robbers coming from Hunza and Nagar, at the far north-west corner of Kashmir, to plunder the caravans and carry off the people into slavery.[1]

Remained then two routes, the one by the Nubra, the other up the Shayok valley, both of which lead to the Karakoram. Until 1914 the first was the one taken by the great majority of travellers and by the trade caravans, despite the serious obstacle of the Sassir pass, which must be crossed to get from the Nubra valley into the Shayok—a considerable strain added to the fatigue of the journey, besides the dangers from the ice on the pass. But the large Shayok valley, enclosed within precipitous walls, with the river running close under one wall or the other, necessitating constant fording, was only possible in the late autumn, when the water was at its lowest, or in the winter when it would be frozen.[2]

It was only in 1909 that the government of India decided to put into effect a recommendation made by Forsyth as far back as 1874,[3] and promote the construction of a caravan route which should go up the valley northwards from the village of Shayok, keeping to the left bank to avoid the frequent fordings.[4] The work went on for three summers, encouraged by the English Resident at Leh. In 1913 it was nearly finished,

Bellew, *Kashmir and Kashgar*, London, 1875 ; also various letters from Forsyth, Shaw and other members of the expeditions, in *Proc. Roy. Geog. Soc.*, Vol. XV, 1870, p. 23, and 1871, pp. 175 and 387 ; *Jour. Roy. Geog. Soc.*, Vol. XLI, 1871, p. 378 ; *Proc. R.G.S.*, Vol. XVIII, 1874, pp. 111 and 444.

[1] Several travellers have chosen the route by the plateaux in order to reach Tibet proper, after crossing the Chang-la and the Marsimik-la : H. Bower did so in 1891, A. Deasy in 1896, C. Dalrymple Bruce in 1905, Sven Hedin in 1906. The latest person to use it was Dr. Emil Trinkler, on his way to Eastern Turkestan (see *Im Land der Stürme* (1927–8) ; Leipsic, 1930).

[2] Thomson, writing in 1848, speaks of caravans taking the Shayok route in the spring or the late autumn (letter in the *Jour. Roy. Geog. Soc.*, Vol. XIX, 1849, p. 25). Cunningham (*op. cit.*, p. 96) estimates the winter volume of the Shayok at 2,000 cubic feet, that of May at 12,000, and that of August at 18,000 cubic feet.

[3] " If the route down the Shayok river, which at present is only taken in winter when the river is frozen, could be made practicable for all seasons, this would, unquestionably, be the preferable route." —Letter from Forsyth in *Proc. R.G.S.*, Vol. XVIII, 1874, p. 113.

[4] In the same year, 1909, Dr. Longstaff, back from the exploration of the Siachen glacier, accompanied Captain Oliver, the English Resident at Leh, on a tour of inspection up the Shayok, to lay out the plan of this road (see Longstaff's account, already cited, in the *Geog. Jour.*, 1910, p. 622).

and of course we had decided to profit by the new route, by which our caravans would be the first to travel.

The expedition left Leh on the morning of May 15th, travelling for the first time as a complete unit; 11 Europeans, the Indian surveyors, the escorting *chuprassis*, some 60 porters and as many beasts of burden, horses and zho. We formed an imposing caravan, led by our good Rasul Galwan, who was very happy and proud of his responsibility. A herd of 200 sheep followed us with their shepherds—a kind of walking supply of fresh meat. Starting at dawn, the sheep, wonderfully adapted to the nomad life, trotted all day to cover the 12 or 13 miles of the stage, nibbling on the way at the scanty herbage growing among the stones.

For two days we ascended the Indus valley. Spring days—the sky was covered in the morning, but later the clouds broke and a hot sun came through, tempered by the cool breeze. The peaks were shrouded; farther down light veils of transparent mist hung above the spurs, with a play of light and shade which made the complicated design of the rocks stand out in bold relief. The Indus covers a wide bed in the open ample valley, running in a network of streams among a mosaic of little green islands. The oases, in all the delicate colouring of early spring, formed a narrow zone of verdure along both banks, at the mouths of flat-bottomed tributary valleys which rise at a gentle slope between the spurs of the range. We passed the castles and *gonpas* of Sheh and Tikse, perched at the ends of the two spurs on either side of the Sabu valley. The right bank, on which the road runs, becomes dry and desert after Tikse; but on the other side the fringe of cultivation continues along the narrow terrace between the mountains and the river-bank. At the mouth of the Chimre valley we were met by a messenger from *kushok* Raspa of Himis, who led us to a little grove near by, where several tents were set up, one of them very fine, with Tibetan decorations in blue stuff applied upon the canvas of the roof. Here the abbot awaited us, to pay us the courtesy of a parting cup of tea. To get here he had had a cantilever bridge flung across the river—barely finished the day before. After this little halt we turned our backs on the Indus, on the banks of which we had spent almost six months, and began to climb the alluvial terrace leading to Chimre. We camped at the foot of the little hill on which the monastery stands.

From Chimre began our real ascent to the Chang-la. Directly above the village we found large numbers of cremation furnaces scattered about the valley, some in ruins, others turned into *chortens*; some were plastered and decorated with blue arabesques. A little farther on the valley forks, the western branch leading to the Wuri-la, a pass nearly 20,000 feet high, not used by caravans; the eastern to the Chang-la. The village of Sakti lies at the entrance of the eastern branch, with a small *gonpa*; on the spurs which enclose it are the remains of ruined forts, with outworks and redoubts and masonry curtains, which reach a good way up the valley. The meadows were full of skylarks, pigeons and other birds, and partridges were calling from the rocks. Beyond the last

group of houses the path cut across the left side of the valley, rapidly gaining height; here we came on the first traces of frozen snow. We set up the tents on a level terrace, about 15,700 feet above sea-level, partly occupied by the dry bottom of an ancient lake from which the place takes its name of Zingrul, or Putrid Bog.

Next day, the 18th of May, we set out early in the morning. It was snowing, and continued to snow all day; fortunately the air was still. The ascent was gradual,

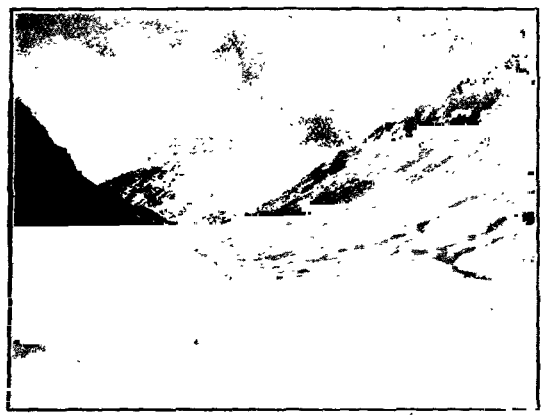
Entrance to the valley of the Chang-la, near Sakti.

and we walked all the way on the track beaten hard by our baggage caravans before us. In two hours we had reached the top of the Chang-la, 18,370 feet high,[1] a broad saddle with a mantle of deep snow that half-covered the *lhato*, the traditional pyramid of stones. Above the snow just appeared the tops of two walls running across the col, built originally as a defence against the Sikh invasion. Clouds and mist veiled the view. The last traveller to cross the Chang-la had been Dainelli, on his return to Leh from Pangkong, about a month before. On the northern slope we found an enormous quantity

[1] 5,598 m., in the French map "Asie 1,000,000e sheet 36° NE." The height is wrongly given in the accompanying Itinerary map as 12,900 feet.

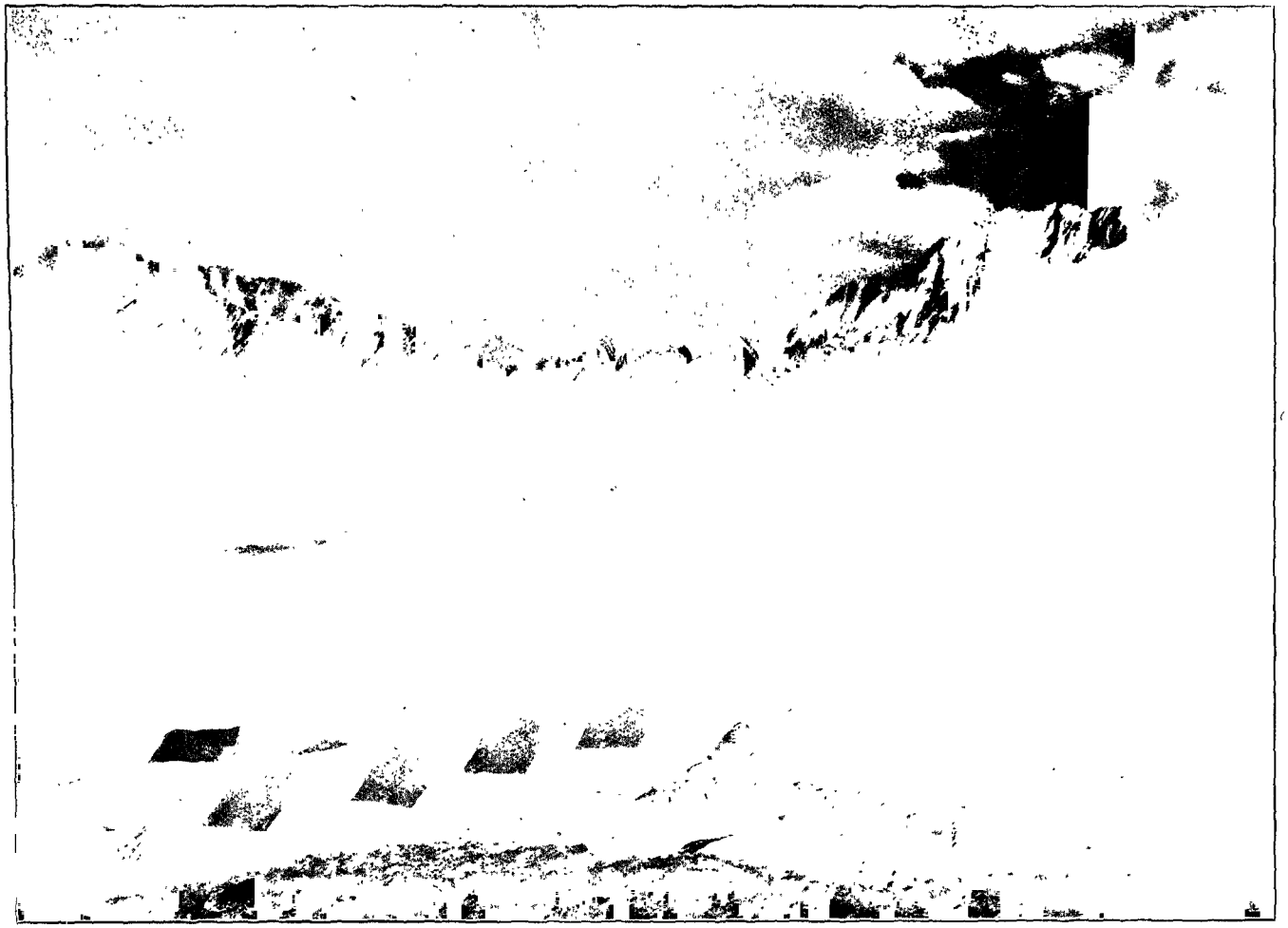
of snow, far more than on the southern; but the track was excellent, descending by a series of rock steps and level terraces, then between old marginal moraines. Farther down the valley became a gorge, and at the very bottom, in a regular well, was the camping-place: a little level spot free of snow, but with a thick layer of dung from horses, yak and zho. It had stopped snowing, but there was an annoying wind that filled eyes and nostrils—and even the dinner plates—with dust from the filth on the ground.

Lower down the valley of the Chang-la once more becomes a succession of terraces, now covered with great sheets of ice, in some places more than 3 feet thick, where the frost had dammed up the flow of the stream. We came out into a place where several valleys meet, the largest of them the Inchun from the west, and the Durgul from the south-west. The latter leads to Tankse, a village of some importance, because it is the only one in the neighbourhood where animals are to be hired and even provisions procured in small quantities. We went down the Inchun, crossed the stream above its meeting with the Durgul and continued up and down the steep spurs of the left side of the valley, until we issued into the Shayok, and there was revealed to us the whole panorama of that vast valley, with the lofty terminal spur of the great range that divides the Nubra from the Shayok directly opposite us, its base washed by the Shayok river at the spot where it makes its hair-pin bend. We slanted down the hill-side and soon reached the tiny village and oasis of Shayok, the last inhabited spot on this side, separated by some 250 miles of mountain ranges, plateaux and desert valleys from the first settled habitation in Central Asia. The village stands on an alluvial terrace, 12,140 feet above sea-level—a few wretched hovels among fields still bare, with low stone walls and some stunted trees. In the midst of the squalor stood out a brand-new white *serai*, evidently just built for the use of the caravans on the new route.



Camp at Zingrul.

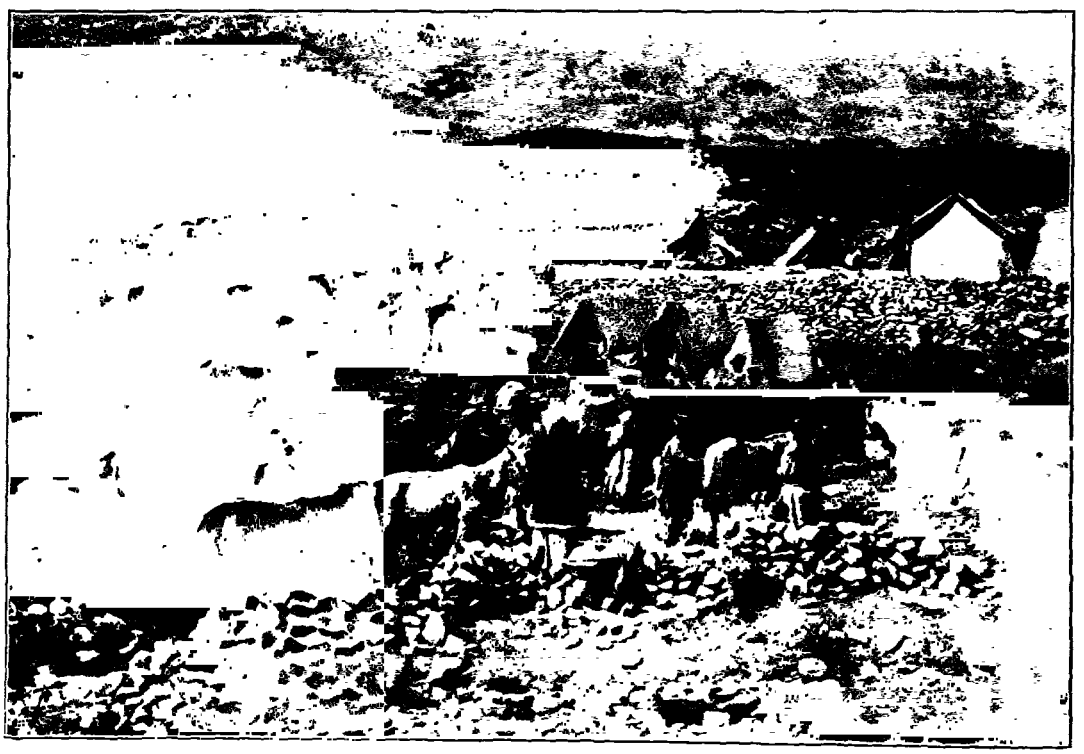
We were detained here for two days re-organizing the caravan. It is the usual thing to dismiss at this point the pack-animals hired at Leh and Chimre and to take on others from the Shayok valley. But all the villages round could not muster more than 52 beasts, and we needed over 100 to carry not only the baggage we had brought from Leh but also 50 loads which had been deposited at Shayok. After long discussion we came to an arrangement. Our animals were only moderately laden, but we had no



Camp at Shayok.

reserves for the remorseless desert we were about to cross; however, I relied upon getting help from our advance transport caravans which we should meet returning from the Karakoram.

While I was thus occupied, Dainelli and Marinelli made geological excursions and studied the natives, nomad Tibetans known as Changpas, who had probably settled down only recently. Wood and Spranger and the surveyors profited by a return of



Requisitioning horses at Shayok.

good weather to make a station on a near-by peak, as a starting-point for a survey of the valley we were about to traverse.

The Shayok is an important river, perhaps the largest tributary of the upper Indus. From its source in the glaciers of the Eastern Karakoram to the village where we camped is a distance of 118 miles, about a third of its whole length.[1] We only covered 70

[1] Cunningham (*op. cit.*, pp. 94 *sqq.*) says that the Shayok (or Khumdan) is the principal tributary of the Indus in its course among the mountains. He gives it a total length of 400 miles, 176 between the source and the village of Shayok and 230 more to its confluence. The first figure is more than 58 miles too high. For a time there was confusion between the names Nubra and Shayok. Vigne, in 1836, while giving the rivers their right names, says that the Nubra is often called Shayok (*op. cit.*,

of these; above them the river flows in certain gorges blocked by glaciers, of which I shall speak farther on. A little below the entrance of the gorges we left the valley, and turned eastward to the Depsang plateau.

The wild and barren valley of the Shayok is like a great trench dug between steep mountain walls: on the west the range of the Sassir-la dividing it from the Nubra valley,[1] on the east the mountains which border the Chang Chenmo and Lingzi-Thang plateaux.

Enrolling porters at Shayok.

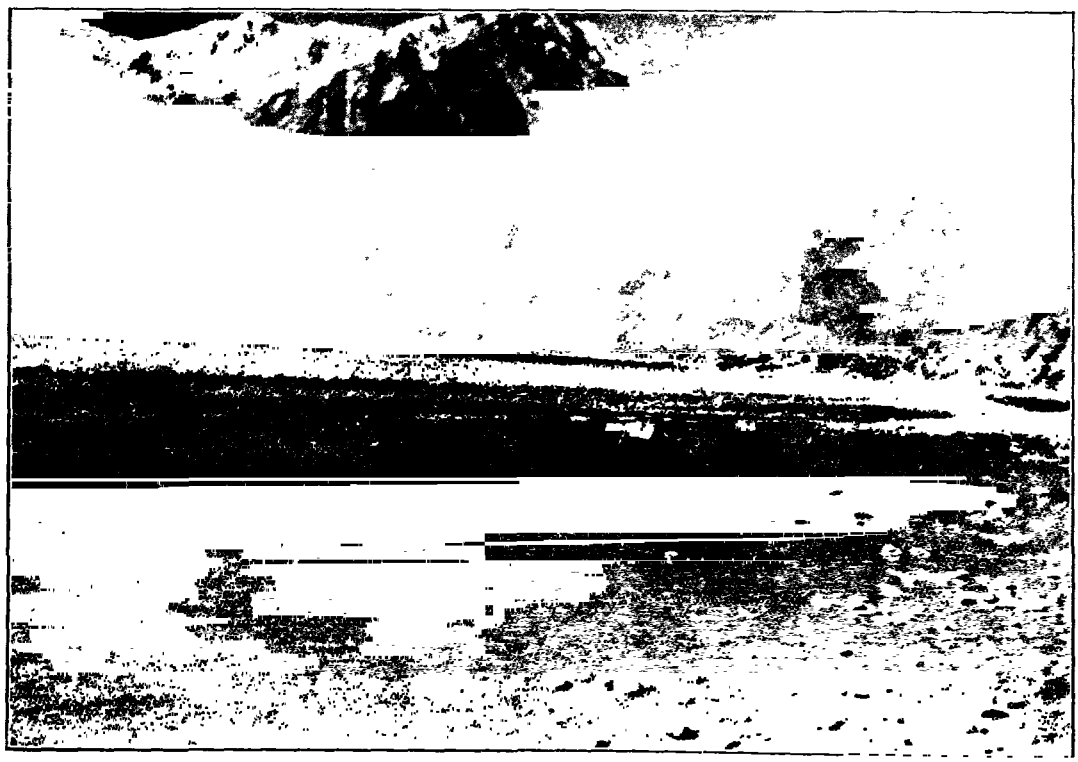
The valley bottom is flat, with alluvial shoals of sand and pebbles; and the river flows in several streams, with banks formed by low terraces of detritus and fan-shaped deltas

Vol. II, p. 358). Thomson, in 1848, gives the names as they are used to-day (*op. cit.*, p. 192); but Col. Godwin Austen ("The Glaciers of the Mustagh Range," *Proc. R.G.S.*, Vol. VIII, 1873, p. 34) says of the Nubra that it is sometimes called Shayok, and he himself calls the Shayok Nubra or Yarma Nubra, and with some others also refers to it as the Northern Indus.

[1] Major K. Mason considers this range (the Nubra-Shayok watershed) to be the continuation of the main range of the Karakoram (*Exploration of the Shaksgam Valley and Aghil Ranges*, 1926; *Records, Survey of India*, XXII, Dehra Dun, 1928, p. 73).

from the mouths of valleys and lateral gorges, bisected by the tributary streams. The ascent is very gentle: from the Rimu glacier, whence the river springs, to the village of Shayok, a distance, as I have said, of 118 miles, there is scarcely 4,210 feet of difference in the level or an average fall of 6·6 per 1,000.[1]

We took up our march on May 22nd, and for 7 days we ascended the desert valley by short stages of 9 or 10 miles a day, the altitude and the scanty food not enabling the animals to do more. Not a mountain or glacier or any feature of the landscape



The big bend, Shayok river.

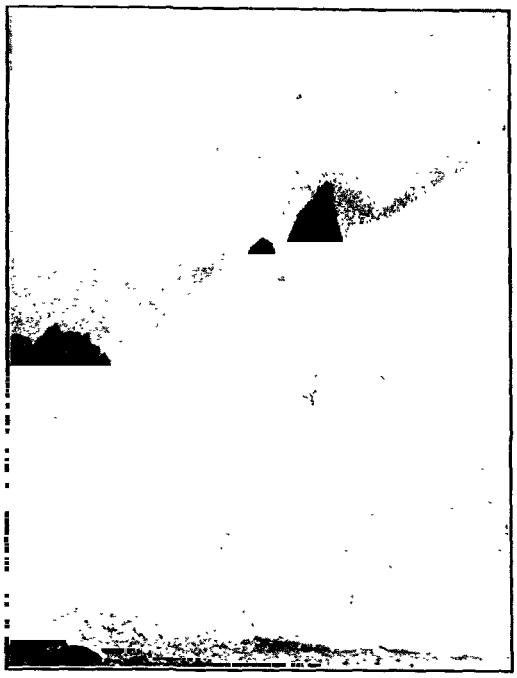
has a name of its own, but the camping-places have, as a rule, two names, Ladaki and Turki, according as it is people from this or the other side of the Karakoram who are using the route.

From the terrace of Shayok we descended directly to the bed of the river; it was still at low water and easily fordable. Thus, instead of following the path up and down the rocks of the left bank we shortened our way by cutting off the great curve

[1] Cunningham (*op. cit.*, pp. 94–5), reckoning 176 miles for this part of the river, gives a rise of 6,000 feet, arriving at the same conclusion of a drop of 6·6 per thousand.

Camp at Tol Depsa, Shayok valley.

the river makes round the southern end of the Sassir range. We stopped on the left bank opposite a huge landslide from the slope on the right, which barred half the valley, and set up the tents in a clump of shrubs, where the buds were just opening, from which derives the Turki name of Chung Jangal, or " Big Jungle." In Tibetan the place is called Tol Depsa, " the hunting plain."



Side walls of the Shayok valley, below the confluence of the Chang Chenmo.

Above us the valley was cut out between two fantastic curtains of granite rock with overhanging precipices more than 1,000 feet high and walls so smooth that they seemed polished; upon these massive foundations rise clusters of towering monoliths, peaks, needles and spires; others jut out obliquely from the wall, like petrified ramparts. It is a profusion, on a colossal scale, of "*crêtes de coq*" and "*dents de requin.*" Yet these are but the supporting spurs, through which from time to time the crests of the lofty lateral ranges of the valley came into view. Nine or ten miles farther on we reached a primitive little bridge flung across the Chang Chenmo near its confluence with the Shayok. The two rivers meet nearly two miles below the mouth of the Chang Chenmo valley, and for this distance they run parallel in two deep grooves in the alluvium of the Shayok valley; both being invisible from the path that runs between them. The Chang Chenmo is an important tributary of the Shayok on its eastern side, coming from the mountains which girdle the Lingzi-Thang plateau on the south. Its valley is wide and open, cutting into the ranges almost to the level of the Shayok valley, like all the other tributaries, even to the narrowest gorges. Up the Chang Chenmo runs a road which joins the plateau route between Leh and Turkestan.[1]

Right wall of the Shayok valley near the junction of the Chang Chenmo.

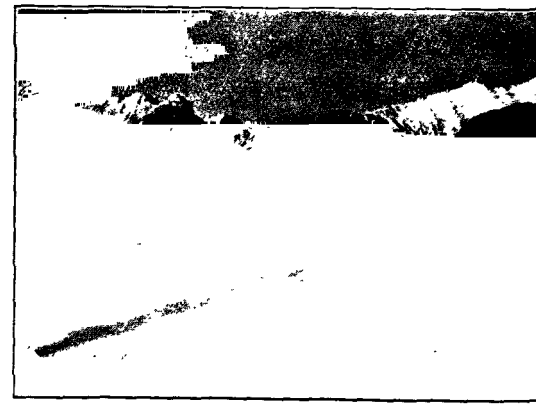
[1] First explored by Captain Strachey (see Cunningham, *op. cit.*, p. 95).

Mountains of the Shayok valley, from the moraine terrace near Shukpa.

A little above the mouth of the Chang Chenmo valley the Shayok betakes itself to the rocks of the left bank, and here we left the path which clambers high up the slope and forded the several branches of the river, following along the right bank up to a large valley which comes down from a huge amphitheatre of glaciers. At one time these reached down to the Shayok valley, and they have left a high and wide moraine which bars the way almost completely and has forced the river over toward the left-hand wall. We climbed up to it, and crossed over its undulations and ridges. Beyond the moraine was an alluvial terrace with a few bushes scattered among the sands at its foot, and here we made our camp. Opposite us, on the other bank, the walls are all pock-marked by the water into regular little niches like a dovecote, and perhaps this feature accounts for the Turkish name of the site, Kapter Khana, or " place of the pigeons." In Ladaki it is called Shukpa or juniper, of which it would seem that there are some bushes in the neighbouring gorges.

Bridge over the Chang Chenmo.

Beyond Shukpa the valley changes its appearance. Gentler and more open slopes succeed to the smooth vertical walls, even the ridges and peaks have softer lines. The granite gives place to schists, in which are embedded calcite masses. We made a short stage over the pebbly shoals, fording the river four times as it wound to lap now one and now the other slope; and set up our tents on a sandy level spot near a little oasis bright with the verdure encircling its spring. This is the Dong Yelak (hill pasture) of the Yarkandis, the Nya Yakmic (yak's-eye fish) of the Ladakis, evidently an allusion to the fauna of the river.



Mountains of the Chang Chenmo, taken from the Shayok valley above the confluence.

In the next two stages we followed the path more closely, up and down over the spurs of the left bank; the porters, however, preferred to keep to the bottom of the valley. We were rewarded by the better path, and from the higher points had a very

Looking down the Shayok valley, between Shukpa and Nya Yakmic.

fine view of the Sassir range. Our fifth camp in the Shayok valley was pitched on the pebbly left bank, while the animals were sent to pasture in the small valley opposite, called by the Ladakis Katlun Chormo (windy terrace). Our next camp was at Yurgolok (abandoned bazar in Ladaki), almost 13,000 feet above sea-level. We were surprised to see the ruins of an ancient fort on a shoulder about 500 feet above the camp; near by were traces of terraced fields with remains of ramparts and a tumble-down house.

Camp kitchen, Shayok valley.

Various legends attach to the spot. A small group of Mon are said to have lived here; farmers who, together with the Dards, are supposed to have preceded the permanent settlement of the Ladakis. Others think that this was a resort of political refugees from Yarkand. Or the fort might be an outwork built by the kings of Ladak against invasions from Turkestan. In fact, not far from the camp was a rounded ridge called So-ri (Sentinel Hill), from which one commanded a long tract up the valley; a guard is said to have been posted here, to light a fire at sight of the enemy, when a second post farther down the valley would repeat the signal, and so on as far as Durgul.

The valley continues high and open all the way, bordered by long stretches of

alluvial terrace showing strata of clay. And there are extensive remains of clay stuck here and there on the sides of the valley, cut into innumerable furrows by the water. And corresponding to these I saw at the foot of several little gorges the deltas of hardened mud, some of them very recent, the residue of mud streams like those characteristic of the Braldoh valley, which I had seen in 1909 on the way to the Baltoro glacier. In our last stages we had often remarked very obvious changes in the volume of the river. Although we had left so many affluents behind us, yet there seemed at times to be more

Ruined fort at Yurgolok.

water than there was below the Chang Chenmo, at other times it seemed greatly diminished. These alternations were certainly not due to the normal daily variations caused by the melting of the snow in the warmer hours of the day. They probably had to do with the sinking of the water for long distances beneath the deep layer of pebbles which covers the bottom of the valley.

On May 28th we reached our last stage in the Shayok valley, at a place called Kataklik (big firewood) in Turkish, and in Ladaki Salakpa (last pasture). We camped on the sandy delta of a tributary stream on the left,[1] coming from a narrow gorge. There was

[1] The Map of India puts Kataklik farther up, at the mouth of the Murgo.

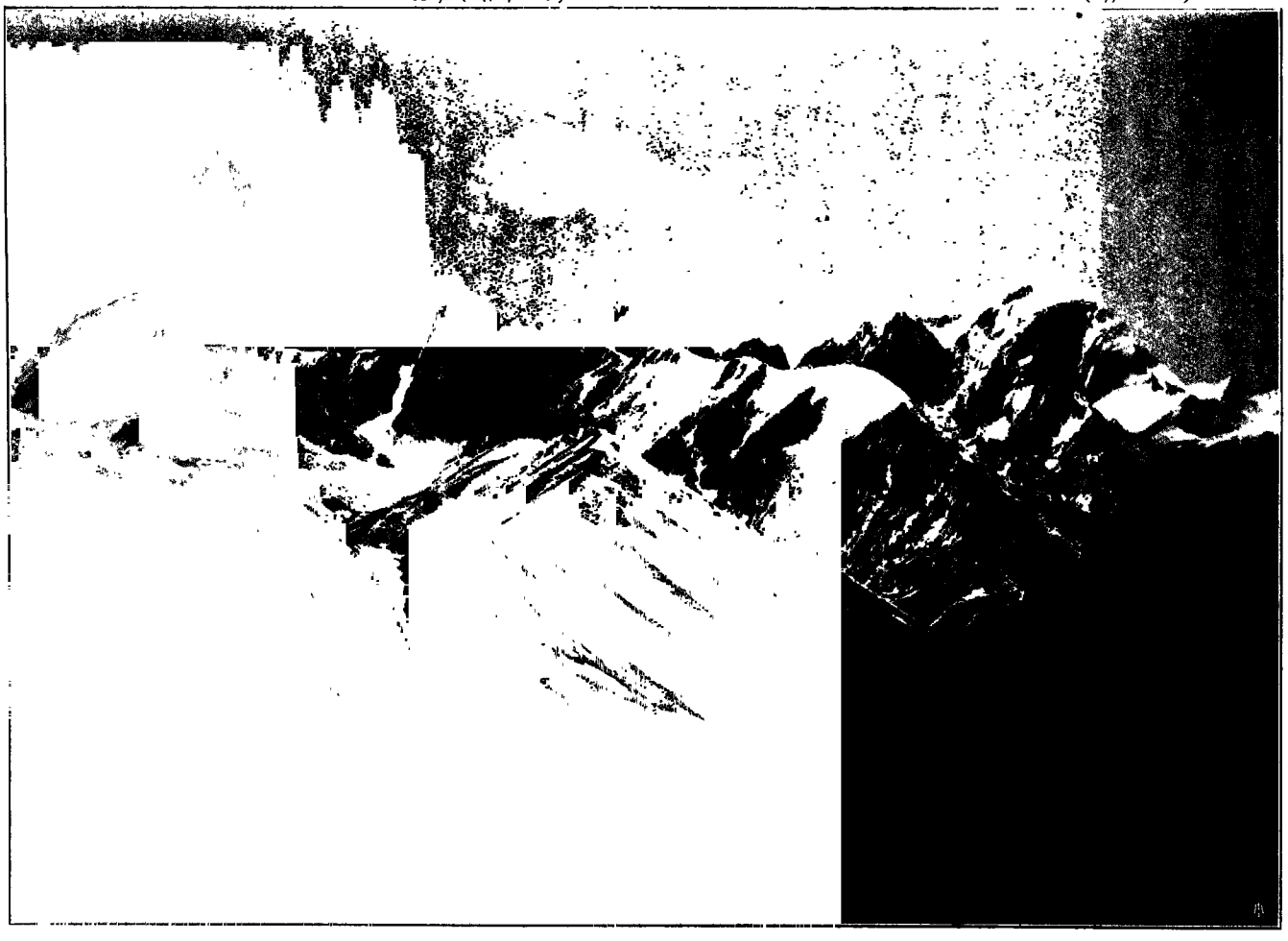
not a morsel of pasture, much less of firewood. However, the horses found a little something above the spur at whose base we had pitched the tents.

The Shayok now looked like a real glacial torrent, turbid with suspended sand. At the mouths of the tributary valleys there were still great sheets of ice—which was not strange, for we were above 13,000 feet. Yet now, at the end of May, the temperature was much milder than one would have expected, even at night and in the early morning; the sunny days were very hot, with the added glare from the mass of white stones that cover the valley bottom. The illustrations reveal the utter barrenness of the region; the names of the camps—jungle, juniper, firewood, bushes, pasture—nearly all refer to the few little clumps of vegetation sprung up round a spring that retains some warmth from the subsoil, as to things most rare and precious in themselves.

Camp at Salakpa, Shayok valley.

The Shayok valley, indeed, despite the new road that has been made, is hard and toilsome for the caravans: a poor preparation for such as are bound for the plateaux and the Karakoram pass, and a cruel added strain for caravans that have just negotiated the passes. The situation would be entirely different if it were possible to have grain and fodder depots along the route. Otherwise the caravans will continue to prefer the risks of the Sassir pass, with its glaciers and its almost 3,000 feet of added height above the Shayok valley; because it leads them straight to the Nubra valley which is extensively cultivated, populous with villages and well supplied with food for man and beast. In the summer of 1914, the caravans which followed us held to the old way rather than take the new; and in 1919, five years after we crossed it, I heard from Leh that the Shayok valley route had not become popular.[1]

[1] Alessio, Antilli and Alessandri returned to India at the end of August, by the Nubra route, taking only 8 days for the journey from Depsang to Leh. Thus we could compare the new route with the old. I quote Antilli's opinion as he wrote it to me: "The Sassir route is much more beautiful, varied and picturesque than that up the Shayok valley, and not too difficult for a small caravan not encumbered with heavy baggage. But the new road is certainly better for a heavy caravan with many horses. Between Murgo and Sassir the Shayok has to be crossed where it is wide and deep; the ford is not without danger, especially to those on foot. The Sassir pass is very fatiguing, and it requires specially trained horses to cross the glaciers. On the other side the road is excellent, through the magnificent Nubra valley, entirely covered with vegetation." Dainelli also used the Nubra road on his way to the Siachen and the Rimu glaciers in 1929; the same way was taken by N. Roerich in 1925 and by Mr. and Mrs. Visser in their expedition in 1929 (*Himalayan Journal*, Vol. III, 1931, p. 14).



Central portion of the Nubra-Shayok watershed
(by telephotography, from a peak above Salakpa).

Our party would certainly not have reached Salakpa with the luggage, had we not been able to replace some of the exhausted animals, and lighten the loads of others, with the best of the horses from the last caravans we met returning from the neighbourhood of the Depsang plateau, where they had deposited our provisions. For ourselves, we had travelled thus far comfortably and without fatigue; though Wood and Spranger with the surveyors had added many hours to each stage by climbing up heights along the valley to make stations for the survey of the road.

Gorges below Murgo.

Above Salakpa even the meagre pasturage which we had had up to now came to an end; therefore we made a day's halt to rest the animals as much as possible. The geologists took the occasion to make a long excursion up the valley. Above Salakpa it gets narrower and narrower between precipitous walls, until it becomes a long series of narrow gorges where perhaps no human being has ever trod; up to the point, 23 or 24 miles higher up, where it is crossed by the caravan road between Sassir and Murgo, running eastward to the Depsang plateau.

Our first stage outside the Shayok valley was long and tiring, for some of us even hazardous. Leaving Salakpa the path straightway climbs the rocky left-hand slope of the valley, runs into a small tributary valley for some distance, then mounts the left side of it, takes one after another two ravines which are the beds of minor tributaries, and through these gradually descends to the valley which is called Murgo from the camping-place above it: a deep, narrow and tortuous ravine, shut in by pointed rocks, where you can only see the sky by tipping your head well back; at the bottom of it flows the stream, rushing over stones, rocks and boulders of every size. Often it

took up all the space between wall and wall, and we had to proceed through the swift-running water, which even at this hour in the morning was up to the horses' bellies. It took us an hour and a half to climb the gully; we emerged into a wider part filled with sand and fine detritus, and crossed it to the end of a spur where the Murgo is joined by another branch coming in from the west. This is the camping site called Murgo, where the two roads of the Shayok and the Nubra-Sassir join [1]; a stretch of bare sand, between the streams and the foot of a bank of conglomerates which covers the end of the spur. Wood and Spranger, with the surveyors, accompanied by Abetti, had climbed up in the morning on the spur behind Salakpa, for their survey work, and descended the other slope toward the Murgo valley. All went well in the lower part of the valley; but when they reached the gullies, at the end of the day, they had great trouble fording the swollen stream. Wood's horse lost its footing on the smooth pebbles and was swept away, dragging his rider with him; the others had to jump in to the rescue. They returned after nightfall, soaked through and numb with cold. The two surveyors, who had been on foot, were obliged to spend the night in the open, and came into camp next morning.

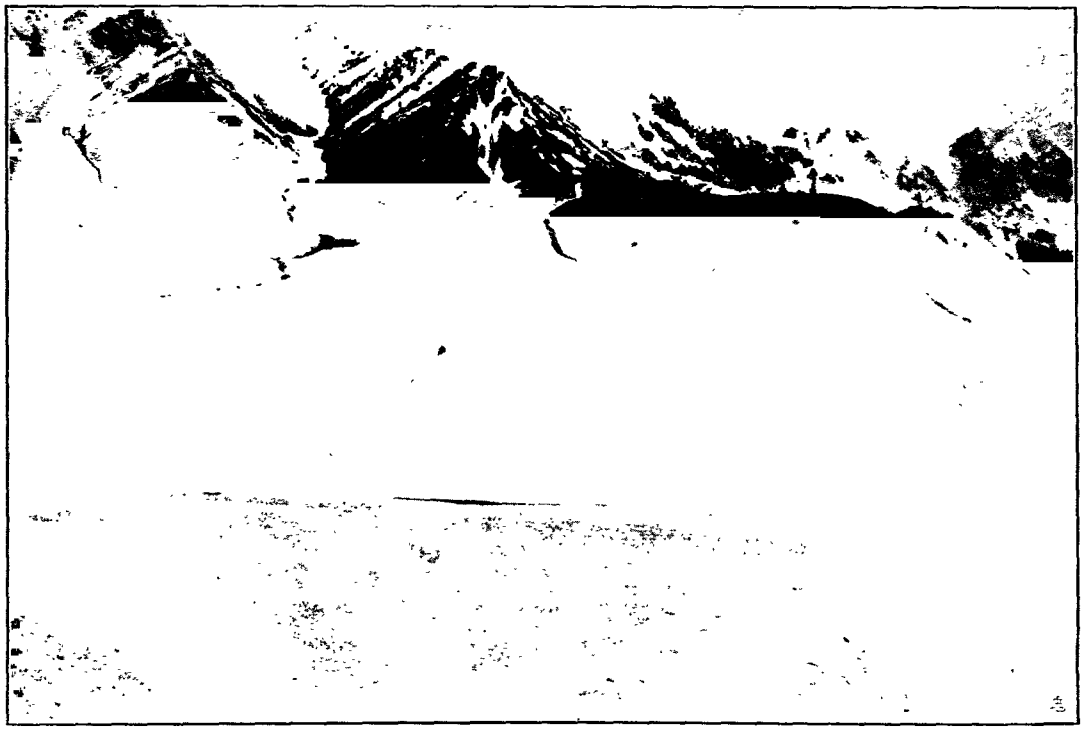
Murgo is a wild and desolate spot, a typical high mountain scene. On the south, beyond the stretch of level sand in which the river channels are sunk, there is a mountain range adorned with a row of small parallel glaciers. At its eastern end is the deep cutting whence the Murgo issues from the plain; on the other side the range continues as the right-hand wall of a wide valley which seems to be a prolongation westward of the plain of the Murgo, and which ascends at a scarcely noticeable incline to a low open saddle, across which one catches glimpses of the peaks of the Sassir range, on the right of the Shayok. In this valley runs the caravan road to Leh by the Sassir pass and the Nubra valley. Beside the terrace at whose foot we set up our camp ran up to north-east the valley by which we were to reach the Depsang plateau. It was visible for only a short distance, with its background like a magnificent stage setting, consisting of a fine limestone wall carved like the façade of a cathedral, in the strangest warm tone of rosy violet, with all the clefts and fissures of the rock of a deep blood-colour that made them look like open wounds.

The caravan had taken nearly 9 hours to cover the long stage. The poor horses reached Murgo worn out, and lay down before their loads were taken off. Later they stood about patient and dumb with hanging heads near the tents—for there was not a blade of grass. They were almost all small Zanskar ponies with slender, well-shaped legs, fine heads and large eyes, most of them with light greyish coats. We still had a few yaks and zho, relics of the fine herd with which we had left Shayok village. They are no good for the protracted marches over stones and pebbles, for their hoofs become inflamed; and they must be turned loose to wander in some grassy valley where they will

[1] At Murgo, in June, 1874, Stoliczka, geologist to the second Forsyth mission, died on his way back to Leh. He lies buried at Leh, in the Christian cemetery adjoining the Residency.

be found weeks later, ready for work again. Apart from this difficulty they are valuable animals for mountain work, slow but sure-footed, strong and extraordinarily long-suffering, finding enough to sustain life in the most arid desert. They are not at all affected by the altitude; the only thing they mind is heat, because of their thick pelts—so that the stage has to be covered in the cooler hours of the day.

Rasul Galwan made the usual anxious survey of our means of transport. Four of the horses were in no condition to go on. For several days we had been using as

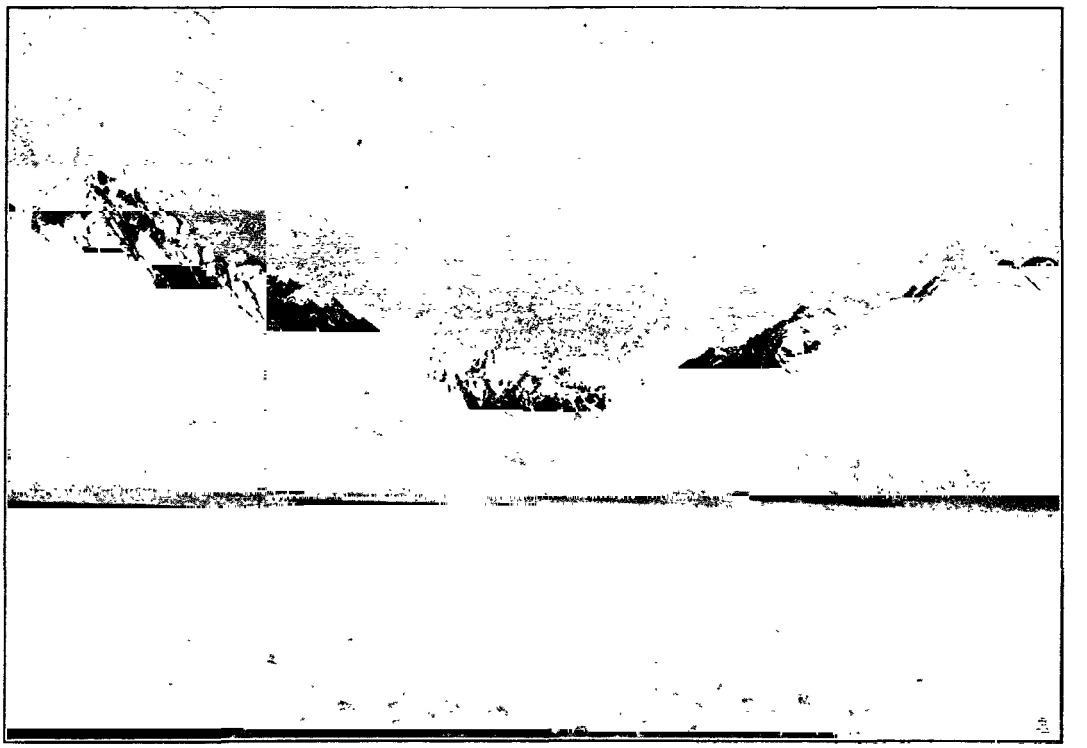


Murgo Camp.

pack animals the horses intended for the servants. Rasul Galwan himself would go on foot from now on, giving his horse to the surveyors to use in turn. We had still two stages to make, involving an ascent of 3,000 feet, and there was no forage to count on save the *burtze*,[1] a dwarf ligneous plant with tufts of little shoots above ground, which had not yet begun to break. The horses would grub these up with their teeth and eat them eagerly; their hunger would even drive them to eat the dry dung by the roadside. But even the *burtze* was scarce and had to be collected over large tracts of ground. The roots are much more developed than the stalks and make excellent quick-burning fuel.

[1] Professor Pampanini has identified this plant with the *Tanacetum tibeticum Hook F. et Thoms.*

Our doubtful reliance on the pack animals made the porters even more precious to us. We had with us the whole contingent of men for the summer campaign: as I have said, there were among them some 20 Baltis, chosen from the 150 who had come to Leh from Skardu. But they were clearly suffering from homesickness, and were not likely to hold out long, far from their own homes. The Baltis carry heavier loads than the Ladakis, but do not bear the altitude and cold so well, partly because they pay



Tributary valley west of Murgo, with the road to Sassir.

no heed to their clothing. In Leh they had been equipped with fresh footwear, woollens and coverings; but in a fortnight these had nearly all disappeared and they were clad in the same shapeless rags as when they had come from Skardu. The Ladakis are harder to handle than the Baltis because they are less simple and ingenuous; but they are more civilized and industrious. They all bring with them a piece of sheepskin, and awls, needles, thread and wool, and in their encampments are always busy mending their *pabbus* and clothing. The most delicate instruments, like the gravimetric pendulums, the chronometers and mercury barometers, had been entrusted to a group of Ladakis who had charge of them for the remainder of the expedition and accom-

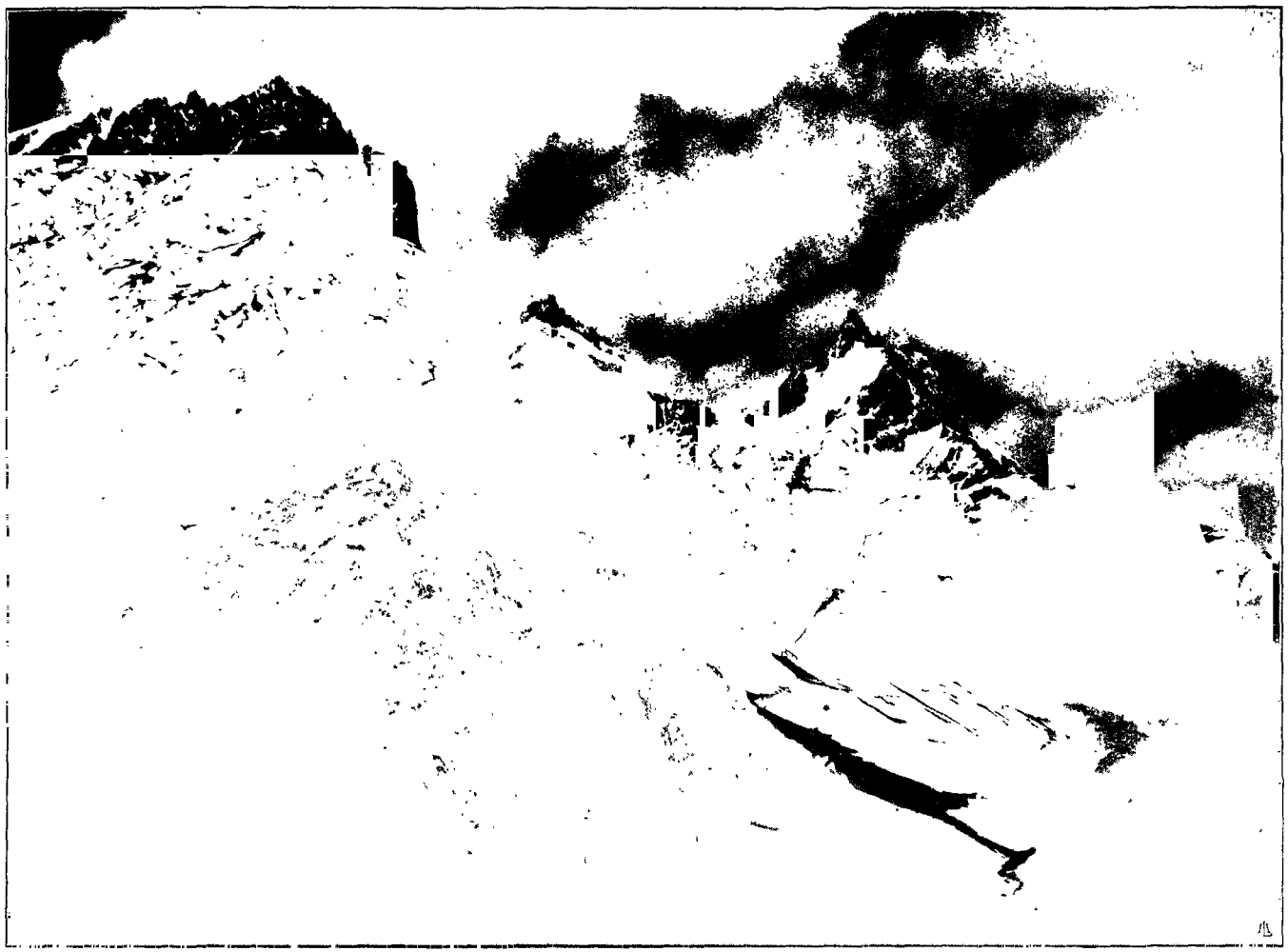
Limestone range above Murgo.

panied us to Kashgar; it was due to the great precautions which they always took to avoid any shock to the precious burdens that our instruments came unharmed through a voyage fraught with such perils to their fragility.

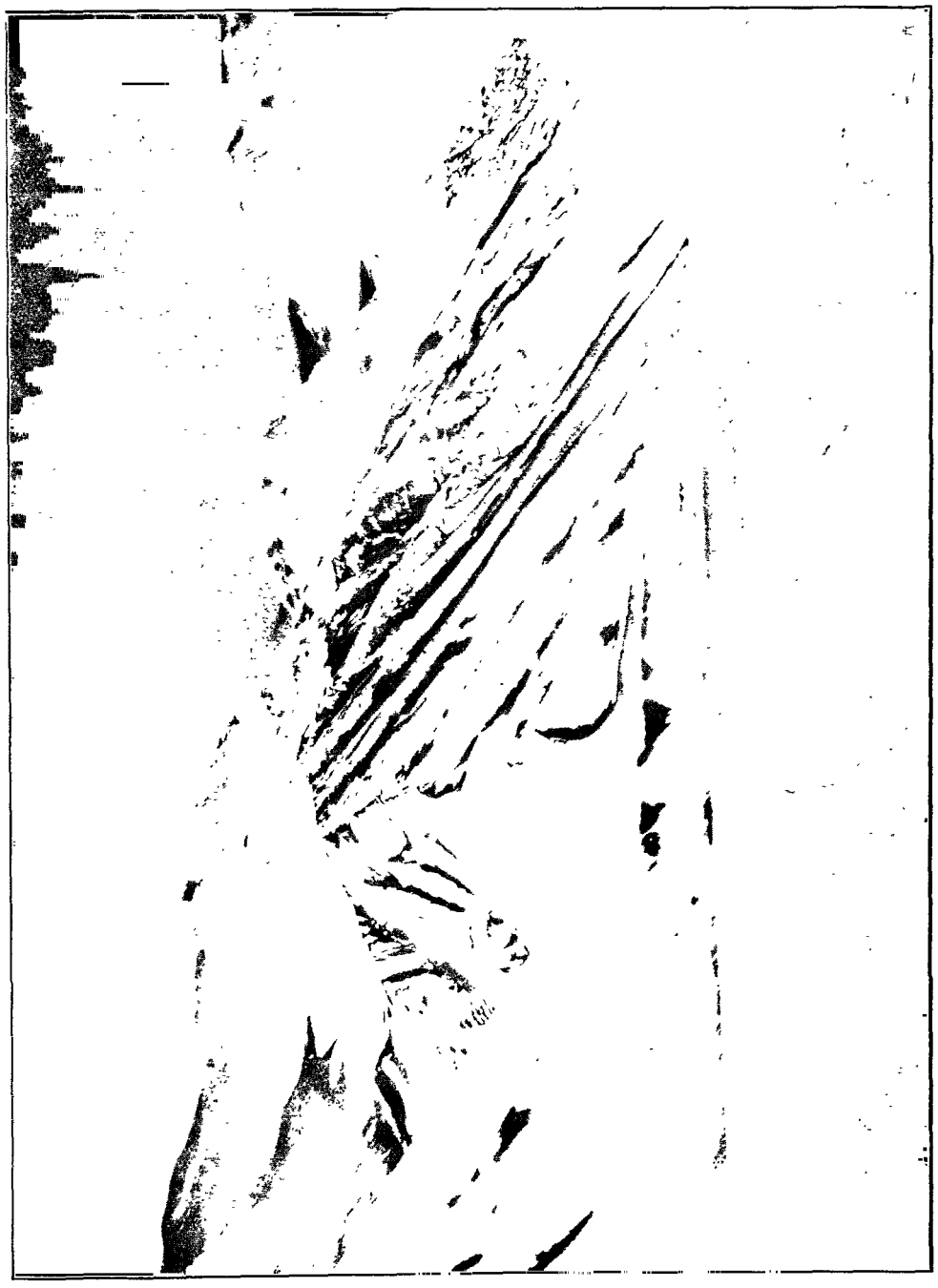
The best trait of the Ladakis is their unfailing good-humour, even on the most difficult and fatiguing marches and under the hardships of the high altitudes; it made contact with them pleasant, it was a help even to the extent of inoculating us too with the same care-free gaiety that enabled them to support the strains and fatigues of the campaign. They even found a way to gratify their love of amusement with dancing and with monotonous songs to the accompaniment of a pipe and a drum improvised out of a paraffin can. As in Baltistan, there was at every stage an enclosure formed by a low stone wall, like a sheepfold, enough to afford some little protection from the wind; and there they slept huddled together with their backs to the wall, their chins on their breasts and their knees drawn up. In the few places where there was enough *burtze* for them to indulge in a fire, they chattered blithely far into the night, with frequent bursts of laughter.

One follows the same valley all the way up from Murgo to the plateau. We surmounted the short gully which opens into the plain by crossing one of the sides high up—it is cut across at one point by an ancient defensive wall. Then we descended to the ice-covered valley bottom, shut in between high walls, then out again by a zig-zag path along the ridge of a left-hand spur. We had from this height a most magnificent view of a tributary valley opening on the right of the Murgo, under the great wall of blood-coloured limestone which we had seen from Murgo. Into this tributary valley flow two great glaciers, bristling with séracs; they come down like foaming torrents from the sides of a very beautiful peak with two points, one rocky and the other snowy. The affluent from this valley enters the Murgo valley by a very narrow opening like a fissure in the rocks. We took to the gorge again for a little distance, coming out at last into open valley with a broad pebbly bottom, occupied by the several branches of the stream—the whole, save for the proportions, very like the Shayok. We clambered over a great landslide of limestone fallen from the sides, and passed a tributary with a curious mouth shaped like two bastions of conglomerates, 60 or 80 feet high and 170–200 long, curving symmetrically toward each other on the flat surface of the main valley. We set up our camp just beyond this point. The place is called Burtze Yokma or Lower Burtze, there being another higher up. Directly the porters arrived and put down their loads they scattered over the slopes of detritus to grub up the few tufts of *burtze* and roll them down for fires for both our and their cooking, and for the horses to nibble at. Of other vegetation there was not a vestige.

The road we were on is one of the hardest and most deadly trade routes in the world. Our last stage, as well as the succeeding ones until we descended into Central Asia, was strewn with the remains of the victims of its severity. The whole way is marked by a double row of bones and carcases of animals, in every stage of decom-



A tributary valley of the Murgo, with glaciers.



Camp at Burtze Yokma.

position; a circle of them lies round every camping-place, with here and there the larger carcase of a camel among those of the horses. Some are dismembered and scattered, others still whole, with the hair and skin more or less mummified, thanks to the dry cold air, and looking like animals just dead, until you see that the entrails are missing. They lie there in every posture: with thin dry legs extended, the head stretched out in anguish, the lips drawn back showing the great incisors, the eye-sockets empty. At this time of year there were no vultures, and but few crows; but they are numerous in the summer when the traffic is greater; and the sight of their black hosts wheeling above a body gives notice from afar of a recent victim.

Between the pastureland of the Nubra valley and the very poor vegetation of the Kara-Kash, beyond the Kuen Lun, lies at least 10 days' travel, in which there is no forage whatever; and the road crosses the Sassir-la (17,600 feet), the Depsang plateau (17,700 feet), the Karakoram pass (18,290 feet), and the Suget (17,610 feet). The merchant cannot carry enough fodder for the animals, or each horse's pack would consist of its own food without any margin for merchandise. Under difficulties such as these it seems incredible that trade should persist between people separated by such formidable obstacles. Forsyth, in 1868, wrote that merchants had to take three extra horses for every load and that a quarter of the animals died on the way. The hire of an animal between Turkestan and Leh was in those times from 42 to 52 rupees [1] and in 1914 it had gone up to 60, or about the price of the animal. And yet, though the climate on the plateau becomes really arctic in winter, the traffic persists though somewhat reduced. In 1907 Sven Hedin met in the upper Shayok a large number of caravans whose transport had been decimated; the road was strewn with abandoned goods; and he even found a man with frost-bitten feet left behind to perish miserably by a party of Yarkand merchants.[2]

However, I am convinced that much of the suffering and a large part of the fatalities could be avoided by more rational treatment and by putting a stop to certain cruel practices due to ignorance and prejudice, which we witnessed and which I will discuss farther on. With moderate loads, not more than 200 pounds, to be lightened or removed if the animal shows signs of fatigue, with a feed of about 7 pounds of barley a day —the horses cannot stand more at this height, in the absence of green fodder—and with reasonable care, adjusting the saddles and pack-saddles so as to do away with the horrible sores which afflict 9 out of 10 animals, the mortality could be greatly reduced. Forsyth, in 1873, lost only 12 horses out of 550. We had not a single loss in the caravans which we accompanied and personally supervised, but in those entrusted to the natives 20 horses were lost between March and May.

From Burtze we continued up the wide flat alluvial bed occupied by the windings of the stream, which in the lower parts looks almost like some of our Alpine valleys,

[1] See Forsyth's letter in *Proc. Roy. Geog. Soc.*, Vol. XIII, 1878, p. 13.

[2] Sven Hedin, *op. cit.*, Vol. II, pp. 245 *sqq.*

near where they issue into the plains; we were, however, close to 16,000 feet high. The low sides of the valley were of polished limestone hollowed out into many openings and caves; above there hung little glaciers, which did not reach half-way down. The air was very mild, the snow melting fast; the stream, which in the morning hours was low, with almost clear water, became toward evening a swift and

Camp at Kisil Lungur.

turbid river, 30 or 40 yards wide. To our surprise we saw not only crows, but some pigeons and flocks of little grey birds.

Twelve or 13 miles farther on the wide valley abruptly narrowed into a gorge between tawny red rocks, and the slope grew steeper. After this short narrow stretch we forded the stream and arrived at Kisil Lungur (Red Hill), a level spot at the foot of a short curtain of red rocks. In the lee of this was a big mound of stuff, covered with tarpaulins: the cases and bags of provisions and all the material sent up from Leh and deposited here in the preceding months when the plateau was still under deep snow. Beside the heap was the little tent of the man on guard, who had been waiting for us

almost two months. In the middle of the little terrace where we set up camp was a great stone pyramid topped by the skull of a horse, with other parts of the skeleton disposed around it. It seemed a monument symbolic of all the region.

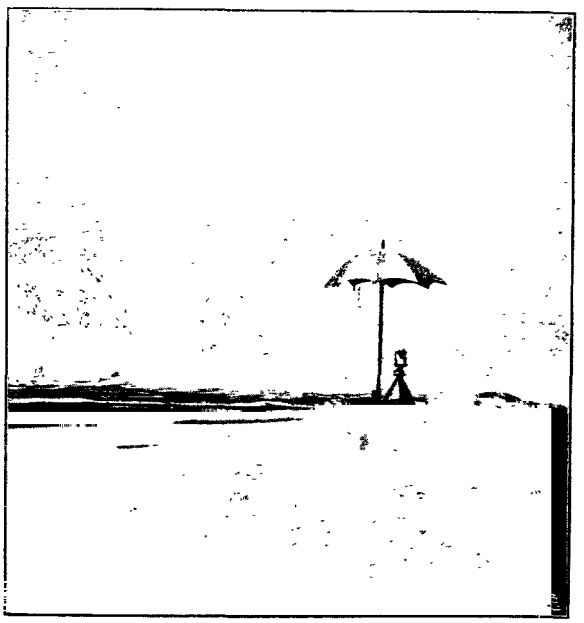
We reached Kisil Lungur on June 1st, before 11 o'clock, and yielded to our impatience to get at once on to the plateau and select the spot which should be our base for the summer campaign. After a short rest 5 of us set out with Rasul Galwan, and made our way up a short side gorge, then by wider slopes which soon brought us to the edge of the plateau, about 17,780 feet above sea-level. There we turned north, across the plain which slopes gently eastward, with broad undulations and slightly marked depressions within which flow rivulets fed by the remaining snow, that finally converge into one single stream, a tributary of the Chipchap. There were still extensive snowfields, without a track—we were the first caravan of the season. The bare soil was composed of fine detritus saturated with water; there were patches of soft mud where we had to dismount lest the horses get stuck. We stopped at the watercourse which runs from west to east and drains the western half of the plateau. On the left bank was a sandy level by the side of the caravan route and sheltered from the north by an undulation of the ground. Here, at 17,600 feet above sea-level, we decided to set up our base-camp on the morrow.

We had come just at the right time. A few days earlier we should not have found a dry place for the tents, and the mud would have made it difficult to cross even this short tract of the plateau; while later we should have had trouble in fording the Shayok river and in traversing the gullies of the Murgo on account of the rapid melting of the snows.

CHAPTER X

THE DEPSANG PLATEAU

Appearance, size and boundaries of the plateau—Flora and fauna—Caravan traffic, merchants and pilgrims—Climate—Depsang station—The expedition's plan of campaign—The summer meteorological station.



ONE is conscious of a sense of doubt and misgiving, in attempting to describe, to those who have never seen it, so extraordinary a feature of the earth's surface as a Tibetan plateau. It is like trying to describe, to those who have never beheld such sights, the sea or a great alpine range with its peaks and glaciers.

The plateau of Pamir, to the north-west of the Depsang and much lower, has been called "the roof of the world." And the phrase is apt—or at least as apt as others which our poor human fancy has coined to describe the various contours of the earth, applying to great natural features words from our own small architecture—like spire and tower and obelisk, terrace and bastion—or even more humble comparisons like back and shoulder, crest, tooth, and so on. Yet, if it be possible to belittle the mountain ranges by conceiving them as rows of buildings, with the valleys like streets between, then one may be allowed to think of a plateau as a roof, from which, if its size does not surpass the limits of vision, one surveys the tops of the surrounding structures. But how shall I describe the ineffable sense of standing between heaven and earth, with a horizon of immeasurable immensity? Or the strange novelty of a vast plain, with that peculiar bareness which belongs to the rocks

and detritus of the high mountains but without snow—abiding snow, that is—yet with a climate typically alpine, the cold air and the burning sun, the indefinable transparency of the sky and the weightless atmosphere which give such a peculiar zest to the high altitudes?

The Depsang plateau measures about 310 square miles, 25 miles from east to west by 12 or 13 from north to south, with an average height of 17,400 to 18,000 feet above sea-level. The valley of the Chipchap, a tributary of the Shayok, about a thousand feet lower, separates the plateau on the north from the range of the Karakoram; on the west and the south it is sharply circumscribed by the great deep valley of the Shayok; while on the east its limits are marked by a series of short ranges, with a few peaks reaching some 3,000 feet above the plain, that enclose the basin where the Kara-Kash river rises to flow into Turkestan. These mountains therefore, are a prolongation westward of the watershed between India and Central Asia. The upper basin of the Kara-Kash was explored by Dainelli and Marinelli; they pushed on eastward of it as far as the desert plateaux of Tibet proper, as high as the Depsang but as much larger as a continent is larger than an adjacent island.

The Depsang, like every other Tibetan plateau, is cup-shaped; yet it is not an enclosed basin, because the circle of mountains round it is broken on the north; where the two branches draining its eastern and western portions join in a single stream, which flows by a short valley into the Chipchap. The surface of the plain is modelled into broad waves, in the trough of which flow the tributary rivulets. This is only at the time of melting snow, otherwise they are dry; but there is always water in the sources of the two main branches at the ends of the largest diameter of the plateau. I may add that several isolated mounds rise here and there on the plain, some 600 to 1,000 feet high, forming excellent sites for the survey-stations.

But the attention does not pause upon these details, being irresistibly drawn to the marvellous circle of mountains at the edge of the plateau. The panorama is divided into two distinct parts, one quite different from the other. On the north and east there is an arc of bare hills and mountains almost entirely without snow, dull-coloured, reddish or black, with a few towering conical peaks. These give place abruptly on the south to glacier-laden massifs, followed on the west by lofty ranges dazzling with snow and glaciers. This is the mountain system between the Nubra and the Shayok, with its three giants, K32, 24,640 feet, K22, 25,160 feet, and K24, 24,650 feet above sea-level. Between the first two and the third, but much nearer, just beyond the edge of the plateau, rises an imposing mountain, 22,750 feet, a great dome of ice, continued westward in another not quite so high, from which descends a large glacier. This mountain is the presiding genius of the plateau, and Longstaff christened it most appropriately Depsang Peak.[1] Not to mention other very beautiful and lofty pyramids and ridges

[1] See map in Longstaff's account in *Geog. Jour.*, Vol. xxxv, 1910, p. 744. But he gives the mountain a height of hardly 22,000 feet.

to the west of the plain, at the back of an open space which forms part of the basin of the Rimu glacier, there is a fine peak, 24,240 feet, with tremendous rocky walls over 6,000 feet high. And from west to north one catches sight, less distinctly, of the distant peaks of the Siachen basin, followed by those of the Baltoro, among which, remote in the distance, nearly 100 miles away, one can, on clear days, get a glimpse of K2. It

Peak 22,750 and mountains south-west of Depsang plateau.

is hard to see how the Schlagintweits could be so impressed with K2 as the most striking feature of the view from the plateau actually as to suggest naming it Depsang.[1]

Despite the great height, of 17,400 to 18,000 feet, and the relatively high latitude

[1] Or Dapsang, as it is spelled by Hermann von Schlagintweit (*op. cit.*, Vol. IV, p. 44). The suggestion was adopted by German cartographers, who have referred to the mountain since then as K2 and Depsang (see for example Andrée's atlas, ed. 1914). In the direction of K2, west-north-west, no other peaks rise high enough to suggest that the Schlagintweits confused one peak with another. There is a profile of K2 as seen from the plateau (Vol. IV, T. VII), but the drawing does not correspond with any peak reproduced in our photographs, and the point from which it was taken is not specified.

(35° 15′ N, about that of the island of Crete) the plateau is not utterly barren of vegetation.[1] But what vegetation! Here and there on a soil of fine detritus mixed with pebbles, especially along the sides of the slopes, are scattered the thick round clumps, almost hemispherical, and greenish-yellow in colour, of a plant which at first sight looks like moss. Later in the season it turns out to be a phanerogam, covered with minute white flowers. It grows from the centre toward the periphery, and where it is very thick often runs together into larger hummocks. In the larger and older plants the centres die and dry out, forming a brown mass surrounded by the greenish circle of the living plant, when they look like a disease, a leprosy of the soil.[2] It seemed strange to find no trace of moss or lichens. Some small plants of two or three other species grow at the edge of the stream near the camp; but in the little valleys which furrow the steep slopes of the plateau, where rivulets flow, there are real patches of grass, like carpets of emerald flung down on the sands, and covered, in the brief summer-time, with tiny flowers. Here our sheep grazed; and here too pastured great herds of antelope and smaller, less frequent flocks of gazelles. But of either antelope or gazelle only the females, for the most part with their young, came to the plateau or near it; so we could not hunt them.[3]

Arenaria polytrichoides, Depsang plateau.

Sometimes we saw a few pigeons, unexpected game at this height; and once two migrating water-birds, but never flocks of migrants. Apart from such casual visitors,

[1] Richard Strachey places the limits of vegetation in Ladak at between 16,000 and 18,000 feet (*Jour. Roy. Geog. Soc.*, Vol. XXI, 1851, p. 77).

[2] Various authors have described this plant in the same terms but given it different names. Henderson, botanist to the first Forsyth mission, called it *Arenaria musciformis*. According to Thomson, it is an *Alsinea* (*cariofillea*), and R. Strachey calls it *Lacospermum rupifragum*. Professor Pampanini has classified it as *Arenaria polytrichoides Edgw*. See the Botanical Report in *Relazioni Scientifiche*, Vol. X, Serie II.

[3] The Tibetan antelope is the *Pantholops Hodgsonii*. Bower (*Diary of a Journey across Tibet*; London, 1894, p. 287) says that it rarely comes down below 16,000 feet. Also that in the summer the sexes separate and occupy different regions: on the southern slope of the Karakoram he saw only females, on the northern only males. As the season advanced, in August, we noticed that the herds of antelope on the plateau were all heading northward (toward the Karakoram), perhaps to join the males. The Tibetan gazelle (*G. picticaudata*) is much smaller than the antelope; it is less numerous but more widely distributed.

CAMP ON THE DEPSANG PLATEAU, 17600 ft.

the only real dwellers in these regions are the big crows, not very numerous even these, intent on their grisly business of stripping the skeletons of the animals left by the caravans. To our surprise we saw no vultures, though they are known to hover at very great heights.

Our base camp was set up at 17,600 feet above sea-level, on the left bank of the western branch of the stream which crosses the plateau from west to east; and about mid-way of its course. The tents were pitched in groups. The European quarter contained our sleeping-tents, and those for the gravimetric apparatus, the astronomical, magnetic and wireless stations, and a common tent for work and study, and an open verandah where we took our meals. On the ridge north of the camp we raised the meteorological hut, the tent for the observations of solar radiation, and another for the barometers and other instruments. Near our camp were the stores, covered with tarpaulins. On the other side was the kitchen, with the tents for the servants, and beyond that the quarters of the surveyors, the Gurkhas and the coolies. All together we formed a little nomad village, such as the plateau had never known before. In the distant past hordes of invaders may have passed this way, among them, in the 16th century, the Mongol army of Sultan Said, numbering, we are told, 5,000 men; but certainly no one before us had ever elected to sojourn on the top of the plateau, or even stop there at all unless driven by necessity.

Pilgrims on their way to Mecca.

But on the other hand the caravans come and go incessantly, in the summer, in astonishing numbers. The first one of the season passed on June 28th, coming from Sanju on the Yarkand road; then more and larger ones came; in July there were four in one day, almost all travelling from Central Asia toward Leh—the Ladakis usually do their trading at home. The caravans were of all sizes, from small groups of 3 or 4 men with 5 or 6 animals to large parties with 40 or more pack-animals; the men on foot or riding asses, the better-to-do merchants on caparisoned horses with the uncomfortable Turki saddles, the stirrups attached to straps of stuff which are one mass of knots, and short reins that come together in a rope's end. Sometimes there was a camel caravan; but the animals were probably exchanged for Nubra horses at the foot of the Sassir col, before crossing the glaciers.

The trade caravans alternated with bands of pilgrims going to Mecca from Khotan, Yarkand, Kashgar and even farther afield. In these were mature men and venerable

ancients with long white beards, veiled women and even children mounted on asses. For some of them this may have been the second or third pilgrimage, a very long and costly journey from Turkestan to Leh, then to Srinagar and the Punjab, whence they take train to Karachi or Bombay and embark for the Persian Gulf or the Red Sea.

The caravans have usually halted on the banks of the Chipchap, north of the Depsang, and cross the plateau without stopping, until they descend to Murgo, a march of over 31 miles. The horses are laden with 200 pounds and over of merchandise, besides the very heavy felt trappings, embroidered saddle-cloths and rude pack-saddle; the driver is not unlikely to mount atop of the great bundle himself, to balance it and keep it steady. When the end of the day's march is reached they give the worn-out animals no rest; after the load is taken off they are made to walk up and down for an hour or more; then with the saddle still on their backs tied up short that they may not lie down; only after a long time are they allowed to drink and refresh themselves. On the march they are not allowed a drop to drink, in the belief that drinking causes the sores which of course are due to the wretched pack-saddles.

But even worse cruelties are sometimes practised. In several of the caravans we crossed on the way to Turkestan I noticed an occasional horse with a bleeding muzzle. I discovered the explanation in a note of Forsyth,[1] to the effect that the Yarkand drivers think by enlarging the nasal passages to cure the asthmatic breathing of the poor animals as they mount up to the heights under their heavy packs. The horse is thrown to the ground and the cartilage of the nose pierced; then the head is drawn back and a tuft of hair from the tail tied into the place; then the animal is released and lashed; when he struggles to his feet the septum is torn.

When a horse falls spent by the way no effort is made to revive it. They take off the load, the trappings and the shoes, and leave it to the crows that soon hover near awaiting its last gasp. Worse still: if any of the party feels a craving for a taste of meat, directly a horse falls down it is pounced upon and its throat cut before it dies. This because it is forbidden to Moslems as to Hindus and Hebrews, to eat of flesh that has not been bled. The practice does at least shorten the final sufferings. A great piece of flesh is hacked out of the hind-quarters and perhaps a piece of hide from the flank to be dried and used to mend boots. Several times on our way across the Karakoram we came on such barbarously treated animals with gaping wounds in neck and rump.

The caravans crossing the Depsang passed close by us without stopping, with a stare of amazement at the unusual sight of our large encampment; at most a word or two was exchanged with our men, and soon the rhythmic tinkling of bells that marked the plodding step of the patient animals was dying away in the distance. The fleeting vision gave a little life to the unspeakable desolation of the place. Then the great plain, with the path across it marked out by the rows of bones along the sides, would once more assume the aspect of a dead landscape presided over by the wind and the cold.

[1] *Proc. Roy. Geog. Soc.*, Vol. XVIII, 1874, p. 114.

As regards the climate of the plateau, the periodic character of the wind is noteworthy: it blows as a rule from the east, lightly in the morning, becoming gradually stronger, even violent as it veers by degrees to south and west; toward sunset it drops, and not a breath disturbs the deep stillness of the night which is so absolute as to give one a painful sense of oppression.[1]

But this periodicity of the wind does not give rise to any corresponding constancy in the weather. In that summer of 1914, on the plateau and neighbouring regions, we had from June to August the most varied and capricious climate. In June the good and the bad days were almost equal; in July and August the second greatly predominated. One could exhaust the meteorological dictionary, trying to describe the weather on certain days, so many were the changes from morning to evening, and so sudden, there was no way of discovering the quarter whence came the good or the bad. After a radiant sunrise the brilliantly clear sky would suddenly be covered by thick clouds, with a heavy snowfall and perfectly still air, interrupted after a few hours by a gale of wind with hail, which would shortly give place to a clear sky once more. The afternoon might be dark, the sky laden with cloud masses, yet the day might end with an evening of ideal loveliness; when the pure sunset would be reflected upon the whiteness of the snow and glaciers of the western ranges; while above the bare mountains on the east hung motionless black storm-clouds, edged with smoky yellow and lit with ruddy gleams; very high up in the open heavens the loose wind-driven light cirrus would be just faintly rosy in the sunset light.[2]

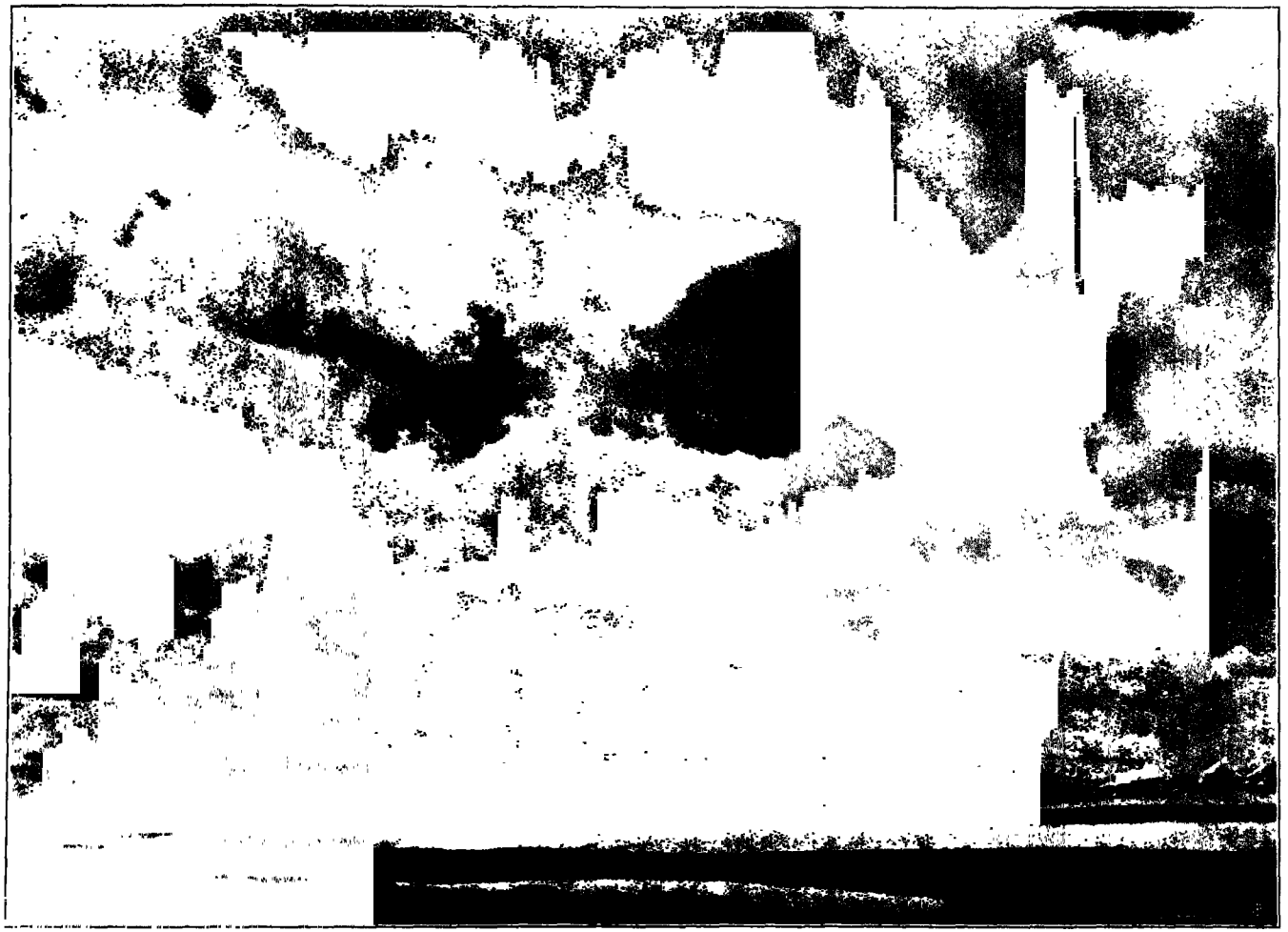
As a rule, when snow fell the air was still, and while it lasted our little settlement in the midst of the vast spotless plain looked like the camp of a polar expedition. With a few hours' sun the picture would change again. In July and August heavy rain sometimes fell, but was never accompanied by noticeable electrical phenomena. As on the Baltoro, thunder and lightning were entirely lacking.[3] In June the thermometer fell at night to between 14° and 17° F., by day it was a little above freezing, perhaps 40°; but the sun was very hot. On warm afternoons the horizon was often girdled by an immense circle of cloud; the refraction caused such powerful mirages as to become an obstacle to the observations[4]; but we had magnificent spectacles in the way of parhelia and paraselenæ, due to the same cause; either in the form of a parhelic circle or cruciform or a mixture of both.

[1] This regular periodicity of the wind on the plateaux has already been noticed by others. See R. and H. Strachey (*op. cit.*, pp. 65 and 57).

[2] H. Strachey (*op. cit.*, p. 65) says that clouds are frequent on the plateau in winter, the cumulus rare in summer, the nimbus almost unknown. But on the Depsang plateau I frequently noticed nimbus, cumulus and cirrus clouds one above the other and also cumulus strata low above the plain. For a classification of the clouds at high altitudes see my *Karakoram*, p. 280.

[3] Dainelli, however, had storms accompanied by electric discharges, on the Tibetan plateaux, as already noted by R. Strachey (*op. cit.*, p. 74).

[4] Drew likewise, in 1869, observed mirages on the Lingzi-Thang plateau (*op. cit.*, p. 338).



Stormy sky on the Depsang.

Fortunately the bad weather was not continuous and did not interrupt the work for long at a time. Wood, Spranger and the surveyors were able without too great difficulty to carry out a survey of the whole plateau and the valleys round it, and there were enough fine evening hours for the astronomical observations connected with the goedetic and geophysical work of Alessio and Abetti.

But there were few days clear and still enough to enable Alessandri and Ginori to get a complete series of measurements of solar radiation. This was a disappointment, for we had expected to be able to get a good harvest of observations at this exceptional altitude, where we supposed we should find a dry, limpid and transparent atmosphere. Instead of which, the sky, even when free of clouds, generally had a whitish tone, due either to a slight condensation of vapour or to the fine dust taken up by the wind on the arid plateaux and deserts of Central Asia and carried to immense heights.

However, in the meteorological field, Alessandri and Ginori carried out observations uninterruptedly for two months and a half, and gathered all the necessary climatological data, including their daily variations, particularly with regard to barometric pressure.[1]

They also launched a fair number of pilot balloons, followed with one, and also with two theodolites from the ends of a measured base, for the purpose of studying the winds.

In the original programme of work planned for the expedition, there had been included a plan of research into the high atmosphere to be carried out on the Depsang plateau, by means of registering apparatus carried by kites, by which we hoped to collect data upon the physical characteristics of the air over long periods of time, at heights of 29,000 to 30,000 feet, near the limit of the terrestrial troposphere. But when we envisaged the difficulties on the spot we were forced to abandon the idea. Besides the miles of metal wire for the kites we should have needed a combustion engine to wind and unwind it on the cylinder, together with the necessary supplies of fuel and lubricant, and the assistance of a mechanic. And we should have had to bring extra apparatus in order to provide for losses due to the breaking of the rope by sudden gusts of wind. All this would have added so much to our impedimenta that it would have paralysed the expedition. But our experience convinced us that the Depsang region, with its sustained periodic winds, would lend itself admirably to such research, and that it would be worth while to organize an expedition entirely for such studies, without the complications involved in the rest of our scientific programme.

The day we reached the plateau we sent back all the horses, since we could not feed them, keeping two only for the geologists to use on their excursions and these we sent for a rest to Yapchan, near the confluence of the Chipchap and the Shayok, where there is a little pasturage. Our 6 saddle-horses were used for the postal service between Leh and the plateau, divided into 3 pairs which took it in turn, so that about every 20 days—barring delays due to floods—we got news from home, and a few dozen eggs as well, a precious addition to the cuisine.

[1] See Vol. III, Series 1 of the *Relazioni Scientifiche.*

The store of provisions that had been deposited at Kisil Lungur was all carried up to the Depsang by the coolies, and this in itself took twenty days. The men came up every day with loads from Kisil and went back to sleep. The Baltis grew daily more wretched and depressed; but fortunately I realized this in time to make a change, and on June the 17th I was able to send them home, 50 Ladakis having come up from Leh. They were accompanied by no less a person than the *lambardar*, the mayor of Leh, Nono Stakzang, a sort of Falstaff, with a jolly fat bearded face, his Ladaki tunic stretched to bursting across his fair round belly; certainly he was little adapted to the rigours of camp life, but he patiently sustained its privations for four months, the severest for him being the lack of *chang*.

Dainelli and Marinelli were the first to leave the base camp: on June the 11th they set off eastward with 45 coolies and 2 horses, bound for the basin of the Kara-Kash and the Aksai-Chin plateau. Twenty of the men returned to camp in a week, having made a cache of provisions for their excursion.

Between the 12th and the 17th I made a preliminary excursion to the front of the Rimu glacier, in order to study its approaches. Antilli and Petigax went with me, also Wood and Spranger, to link up the Rimu to the survey of the plateau. At the same time a group of coolies began transporting the provisions needed for the work on the glacier.

Between the 24th and 27th, Alessio and Abetti, having determined the local time on the Depsang, carried their calculations to the foot of the Rimu to fix its astronomical co-ordinates. In order to be able to complete their programme in the short summer season, Alessio and Wood arranged to divide the work between two separate groups working simultaneously. Alessio, with Abetti and Antilli, were to carry out the survey and the illustration of the Rimu glacier, with the assistance of the surveyor Jamna Prasad. The watershed and its valleys lying between the Rimu and the Karakoram pass fell to the share of Wood and Spranger, with the surveyor Shib Lal. Petigax, of course, joined the glacier party.

On June the 22nd Shib Lal returned to camp after several days' absence, spent in surveying the Murgo valley and the Shayok between Sassir and Salakpa. Jamna Prasad finished on the 25th the survey of the plateau and the surrounding region. On the last day of June we completed the transport of food supplies to the foot of the Rimu glacier and to the neighbourhood of the Karakoram pass, for the two exploring parties. On the morrow the Rimu party left camp, and Wood and Spranger were off next day. Dainelli and Marinelli were still away on the distant plateaux of Tibet.

Alessandri and Ginori were left alone at the base camp, in the midst of that waste of stone, with no resource save the patient collection and co-ordination of meteorological data from their instruments. They served as a link between the two field parties receiving and sending off by couriers the letters by which each party kept the other informed of the progress of its labours.

CHAPTER XI

THE RIMU GLACIER[1]

The exploring party—The Rimu basin from the edge of the Depsang—The old Karakoram route—The narrows of the Shayok and the Kumdan and Aktash glaciers—Variation in their volume—The snout of the Rimu—The search for an approach—On top of the glacier; the first camps—Confluence of the northern branch of the glacier—The offshoot of the Rimu beyond the watershed—The source of the Yarkand river—Exploring the northern Rimu—The main stem of the Rimu—The upper glacier basin—Snow, crevasses and bad weather—Descent of the glacier—Exploring the southern branch—Return to the base-camp.

AT last there dawned the long-awaited day which was to see the beginning of our campaign of exploration. No one who has not experienced it can comprehend the state of intense expectation and eagerness which seizes those who are about to pass the limits of the known earth, as marked and measured on the maps, and to enter into the new and the unknown. No matter if these consist of glacier-filled valleys, or empty expanses as dry and sterile as landscapes in the moon; for the imagination it is enough that no one has set foot there before. The shape, size and direction of a valley become the subject of impassioned debate; the yearning to arrive at a notch in a ridge in order to see the other side makes the intervening slow ascent almost insupport-

[1] See the panoramas of the Rimu glacier in the pocket inside the back cover.

able. One lives in a constant strain of impatient curiosity. True, the region we were about to penetrate was represented on the maps; but we knew that these were partly based on doubtful information and partly invented.

On the morning of July the 1st we left, Alessio, Abetti, Antilli and I, with Petigax and Jamna Prasad. Ginori came with us to carry out a series of barometric observations at the foot of the Rimu, which, when co-ordinated with those of the station at Depsang, would give us another element for determining the height of the glacier front. Wood and Spranger would set out on the morrow with Shib Lal and 40 coolies, leaving Alessandri at the base camp, with Nono Stakzang the *lambardar* of Leh, and four of the less robust coolies to perform the duties of the camp and to gather *burtze*. Rasul Galwan would be leaving soon, to collect among the Kirghiz beyond the Karakoram the means of transport to get us over the ranges which separated us from Central Asia.

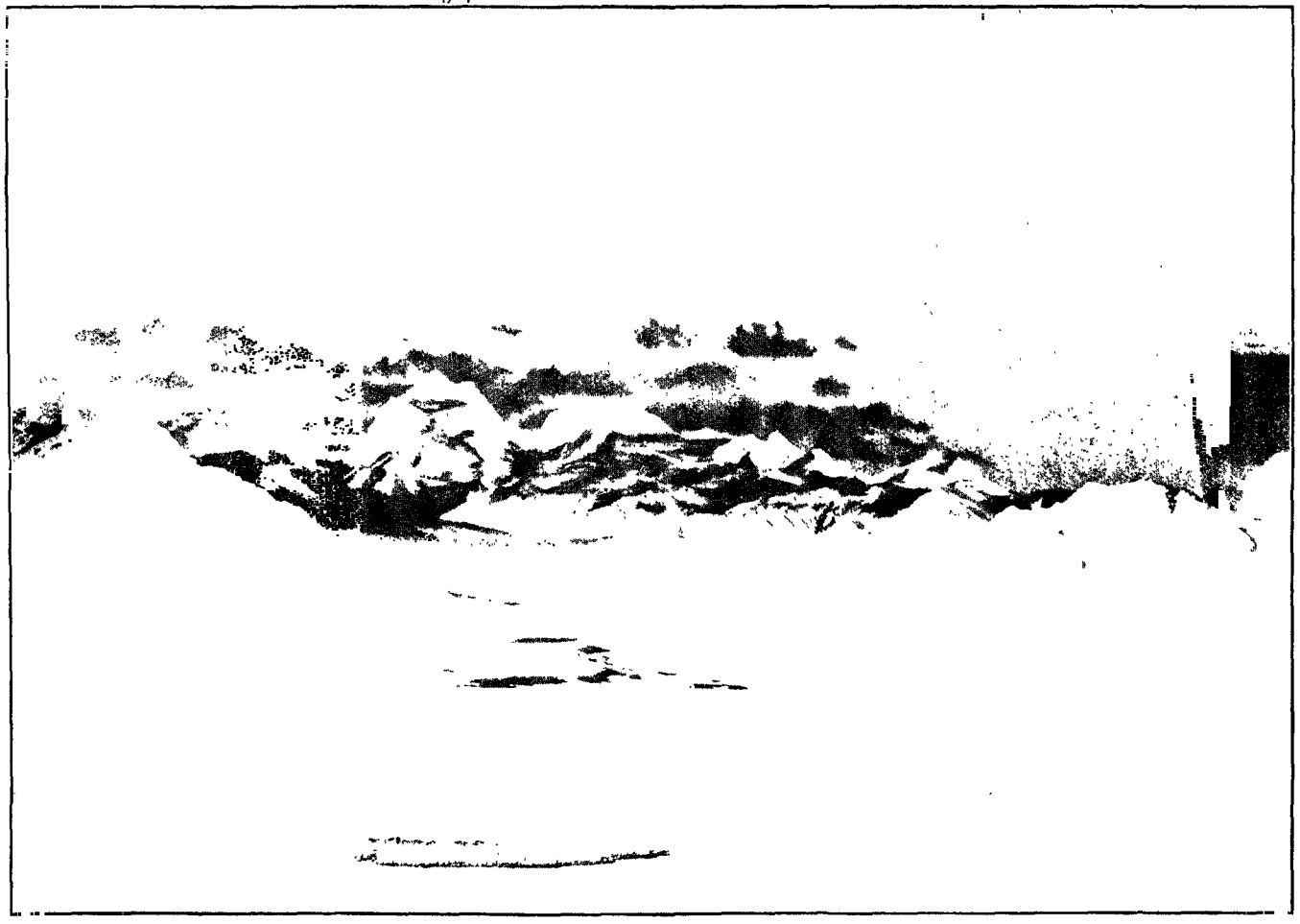
Our party had 46 coolies: 20 from Kargil and 26 from Ladak. The strongest were carrying double loads, for we had still to transport some of the provisions we should need during the exploration of the Rimu, as well as the camp material. We had a light high-mountain equipment: small alpine tents with waterproof canvas floors to lay the sleeping-bags on—in lieu of camp beds—kitchens with Primus stoves, and the personal outfits reduced to a few extra woollens. Add the ordinary mountaineering outfit of ropes, ice-axes, snow-shoes and snow-spectacles for us and the porters, who were also provided with proper clothing, gloves and nailed boots.

We took our way westward up the small stream which ran past the base camp. A path had been broken across the plain by the caravans which had been carrying our provisions to the foot of the Rimu. The snow was almost all gone and the ground dry and firm nearly everywhere. In a little over two hours we had reached the western edge of the plateau, and the Rimu lay immediately before us.

The vast open basin has an ample entrance between two symmetrical cone-shaped peaks, almost bare of snow. Beyond lie the terminal portion and snout of the glacier, occupying the whole width of the valley, nearly two miles across, and formed by the junction of two large branches. One of these ascends to the north, passing on the left behind the rocky promontory I have mentioned; the other, just opposite us, mounts westward into a large valley ending in a broad basin at the foot of a circle of great peaks dominated by one impressive mountain in their midst (24,240) full of sharp angles, and distinguished by two deep saddles on its sides.[1] A broad band of moraine marks the junction of the two branches of the glacier, extending from their front to the promontory at whose base they meet, like a black stripe between two clear streams of ice. In front of the glacier is a wide tract of level valley, taken up by the windings of the glacial streams which are the sources of the Shayok; it extends to the foot of the western slopes of the Depsang, where it turns due south.

A short coomb leads down from the edge of the plateau to a valley with a stream

[1] This peak is now called Peak 50/52 E, 24,230 ft., by the Indian Trigonometrical Survey.



Front and southern branch of the Rimu glacier, from the western edge of the Depsang.

whose source is certain small glaciers to the south ; the valley runs westward and empties into the Chipchap. The flat banks of the stream were covered here and there with small stretches of meadow, where among the tender grass was a little touch of spring-time—tiny flowers and hovering butterflies : an incredible relief to eyes that for weeks had gazed at nothing but rocks and snow. All the flowers were stemless, save one kind of ranunculus. On the neighbouring slope we put to flight several gazelles, followed by their young, leaping and jumping like kids. And at the bottom of the small valley, which we reached in two hours and a half from the edge of the plateau, we found our little flock of sheep, guarded by two shepherds. We camped on the bank of the Chipchap, near the junction of the stream which we had followed on our descent. The river was in flood and very muddy, running in a rather shallow pebbly bed perhaps 100 yards across ; about three miles farther down it empties into the Shayok.

Near our tents were a few bleached bones—a sure sign that we were on a caravan route. There was a time, in fact, when one could reach the Karakoram by proceeding from Sassir up the Shayok valley and thence up the Chipchap to the foot of the pass between India and Central Asia, turning the massif of the Depsang instead of traversing it. This more convenient and less toilsome route had to be given up because of the advancing glaciers, which came out of the tributary valleys on the right bank of the Shayok and ended by blocking the main valley completely. There are three of these glaciers, called from north to south Great (*Chok*) Kumdan, Little (*Kichik*) Kumdan, and Aktash, below which there is also a Little Aktash, which however does not seem to have reached the valley in recent times.

What we know of these glaciers for the last hundred years shows that in their alternate advances and retreats, due to variations in volume, now one now the other has spread right across the Shayok valley, forming a more or less complete barrier or dam. The Shayok river has to flow in the narrow space left between the front of the glacier and the opposite side of the valley. If the ice advances so far as to wedge itself against this side, the river must tunnel a passage below the glacier [1] ; but if the advance has been too swift or if the passage gets closed by falling blocks of ice, the water will collect above the ice-dam and form a lake, which will remain until the front of the glacier once more retreats, or until the dam breaks under the pressure of the water, when a flood will result. There are numerous accounts of the successive formation of a lake and its sudden emptying, with resultant accidents. When Vigne was at Leh in 1873 he heard reports of a lake and represented it on his sketch-map under the name of Nubra or Kundun Tso, as the source of the river " Shi-yok." According to the information, the lake at that time was a mile and a half to two miles long by about half a mile wide. Vigne [2] also des-

[1] A situation similar to this in the upper Shayok valley but on a much larger scale exists also in the Braldoh valley, a little below the snout of the Baltoro ; where it is almost entirely blocked by the Biafo glacier (see my *Karakoram*, p. 163).

[2] Vigne, *op. cit.*, Vol. II, pp. 319 and 362.

cribes a catastrophic flood in the Shayok valley some years before,[1] caused by the sudden emptying of the lake, which had broken through the barrier of ice. The great wave swept through the whole valley in a day, destroying many villages. H. Strachey also describes the same catastrophe in great detail, and says that it occurred in 1833; he also mentions another lesser flood in 1839.[2] It was these cataclysms that destroyed what poor vegetation there was in the Shayok valley—tamarisks and willows—and made of it the present desert of sand and pebbles.

According to Cunningham, the route through the upper Shayok above Sassir was still open in 1822, when Moorcroft was at Leh. Four years later, for the first time in the memory of man, the river was blocked and the road had remained closed ever since. He also says that the valley is closed by other glaciers below Sassir, presumably in the stretch between Salakpa and Sassir [3]; but I find no confirmation of this in other authors.

The first European to behold the glaciers of the upper Shayok was Thomson, in 1848. He says:

"A few miles above Sassar (Sassir) two magnificent glaciers come down from the mountains and cross the whole bed of the stream, which runs underneath them.[4] I mounted the lower glacier (Great Aktash), which was very rough and uneven, flanked by two moraines which rose 50 feet above it; but I did not try the second (Little Kumdan) which the guide considered impracticable. Thus I could not see the Great Kumdan, nor confirm the presence of lakes above it."

Thomson asserts that up to 10 years before the regular Yarkand route passed through this part of the Shayok valley.

Johnson also took this route on his return from Khotan; but gives no details either of the Rimu or of the glaciers of the upper Shayok in the only account of his journey which has been published.[5]

Shaw, returning from Yarkand and Kashgar in 1869, covered the whole length of the old road by the Chipchap valley and the upper Shayok as far as Sassir, and gives us the first description of the Rimu glacier, as he saw it from a point near the confluence of the Chipchap with the Shayok, about 8 miles away; and of the position of the glaciers barring the Shayok valley as they were at that time. The river flowed in a tunnel under the Little Kumdan, and there was no lake in the level valley above the gorges.[6] Hayward, however, who parted from Shaw in the valley of the Kara-Kash in order to

[1] In 1833, according to Cunningham (*op. cit.*, p. 100).

[2] H. Strachey, *op. cit.*, pp. 55 *sqq.*

[3] Cunningham, *op. cit.*, pp. 99–101. As an historical curiosity I may give Cunningham's theory, suggested to him by the apparent suddenness with which the flow of the river was arrested, that the descent of the glacier results from its melting and consequent shrinking away from the side walls of the valley; when, lacking the support of these, the whole mass slithers down.

[4] Th. Thomson, Letter in *Jour. Roy. Geog. Soc.*, Vol. XIX, 1849, p. 36; also in *Western Himalaya and Tibet*, p. 438.

[5] *Jour. Roy. Geog. Soc.*, Vol. XXXVII, 1867, p. 1.

[6] Robert Shaw, *op. cit.*, pp. 432 *sqq.*

return as he had come by way of the plateaux and the Chang Chenmo, did not see the Shayok and identified its upper part with the Chipchap, whereas the latter is obviously of secondary importance.[1]

Sir Douglas Forsyth, going to Turkestan for the second time in the autumn of 1873, having reached Sassir by way of the Nubra valley, followed the upper Shayok valley with some of the members of the mission. One of them, Colonel T. E. Gordon, describes it briefly in his book. He speaks of only two glaciers, the Upper and Lower Kumdan, which did not then bar the valley entirely but left a passage open for the river against the left-hand side.[2]

The best summary of the historic data we possess on the variations of these glaciers and the alternate forming and emptying of the lake above them is given by Longstaff,[3] together with a precise description of their position when he saw them with Captain Oliver. There are proofs of very rapid change, even within the limits of a single season. It seems that up till 1902 or 1903 the caravans continued to use the route in the winter, fording the river at low water to round the ends of the two Kumdans. In the winter of 1902–3 the Little Kumdan advanced very fast, entirely closing the valley once more. There followed a great flood in 1903. Then, two years later, the Aktash advanced in its turn over the river, which however succeeded in keeping open a channel under the ice. In 1909 the valley was blocked by all three glaciers, yet the flow of the river was not impeded and no lake was formed.

The series of observations has now been carried down to 1914, thanks to the excursion of Dainelli and Marinelli into this part of the valley, as we shall see in a later chapter.[4]

On July 2nd we covered the second stage from Depsang to the foot of the Rimu.

[1] Schlagintweit too (*op. cit.*, Vol. IV, pp. 11 and 42) calls the Chipchap the Upper Shayok. And the natives spoke of the Chipchap as the Shayok to Thomson, when he crossed it between Depsang and the Karakoram (*op. cit.*, p. 431).

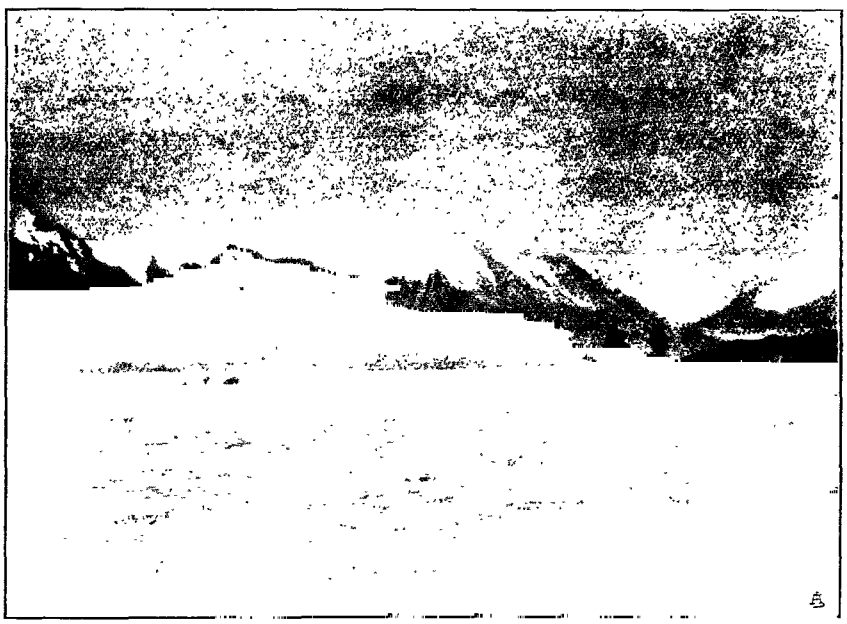
[2] Gordon evidently did not realize the position of the Rimu; for he says that the glacier "has been known on several occasions to protrude right across the valley of the Shayok, so as to dam up the stream and form a large lake, ending in a catacylsm when the water finally bursts through the ice and rushes down the valley in a mighty and destructive flood wave, similarly as has been observed of the Kumdan glaciers lower down" (*op. cit.*, p. 20). A glance at the map shows that the Rimu can indeed advance and occupy a larger or smaller area of the Shayok valley, at the head of which it lies; but can never dam it up. Gordon's book has several illustrations of the Kumdan glaciers and the Rimu, which however do not give an idea of the positions of the glaciers.

[3] In an appendix to his account, already cited, in *Geog. Jour.*, Vol. XXXV, 1910, pp. 647–653.

[4] A preliminary summary was published by Dainelli and Marinelli: "Osservazioni sui ghiacciai sbarranti l'alta valle dello Shayok," in the *Rivista Geografica Italiana*, anno. XXIV, 1917. The definitive account is in Vol. IV, Series II, of the *Relazioni Scientifiche* of the expedition, pp. 346 and 389. See also "The Shyok Dam in 1928," by F. Ludlow, in the *Himalayan Journal*, Vol. I, 1929, p. 4; "Indus Floods and Shyok Glaciers," by K. Mason, *ibid.*, p. 10, and "The Shayok Flood," 1929, by T. P. Gunn, J. P. Todd and K. Mason, *ibid.*, Vol. II, 1930, p. 35. The latest visitors to these glaciers were Mr. and Mrs. Visser in 1930 (*Himalayan Journal*, Vol. III, 1931, p. 107).

Jamna Prasad had left us the first day, to finish the survey of the western slopes of the plateau and the narrows of the Shayok valley, with their glaciers.

We had first to cross the Chipchap—an easy enough ford in the early hours of the morning; yet even so the water was half-way up the men's thighs, and laden as they were they had a hard time keeping their footing on the slippery pebbles. Once across we were on the high bank of the Shayok and skirted upwards to a series of small coombs formed into a longitudinal fold along the left side of the valley. Then we traversed the bottom of this fold, which was covered for long stretches with a thick layer of saline



Fording the Chipchap.

incrustations, with some residual marshland; and also skirted the shore of a lake in a little basin, where we startled a flock of water-fowl. The ground was traversed by several well-trodden paths, for which we could not account, until we realized that they were made by antelopes and gazelles. We surprised a Tibetan hare too, who scuttled away among the stones; and came upon the skeleton of a horse, with an old Yarkandi saddle close by, obviously the remains of an animal strayed from a caravan.

From time to time, through gaps in the ridge of the furrow we were following, we could see the wide level bottom of the valley, channelled by the streams that form the source of the Shayok. Beyond lay the beautiful mountain range to the right of the valley. All the way we had before us on the west the southern branch of the Rimu and the mountains which encircle it at the top. We crossed a last level, stony tract

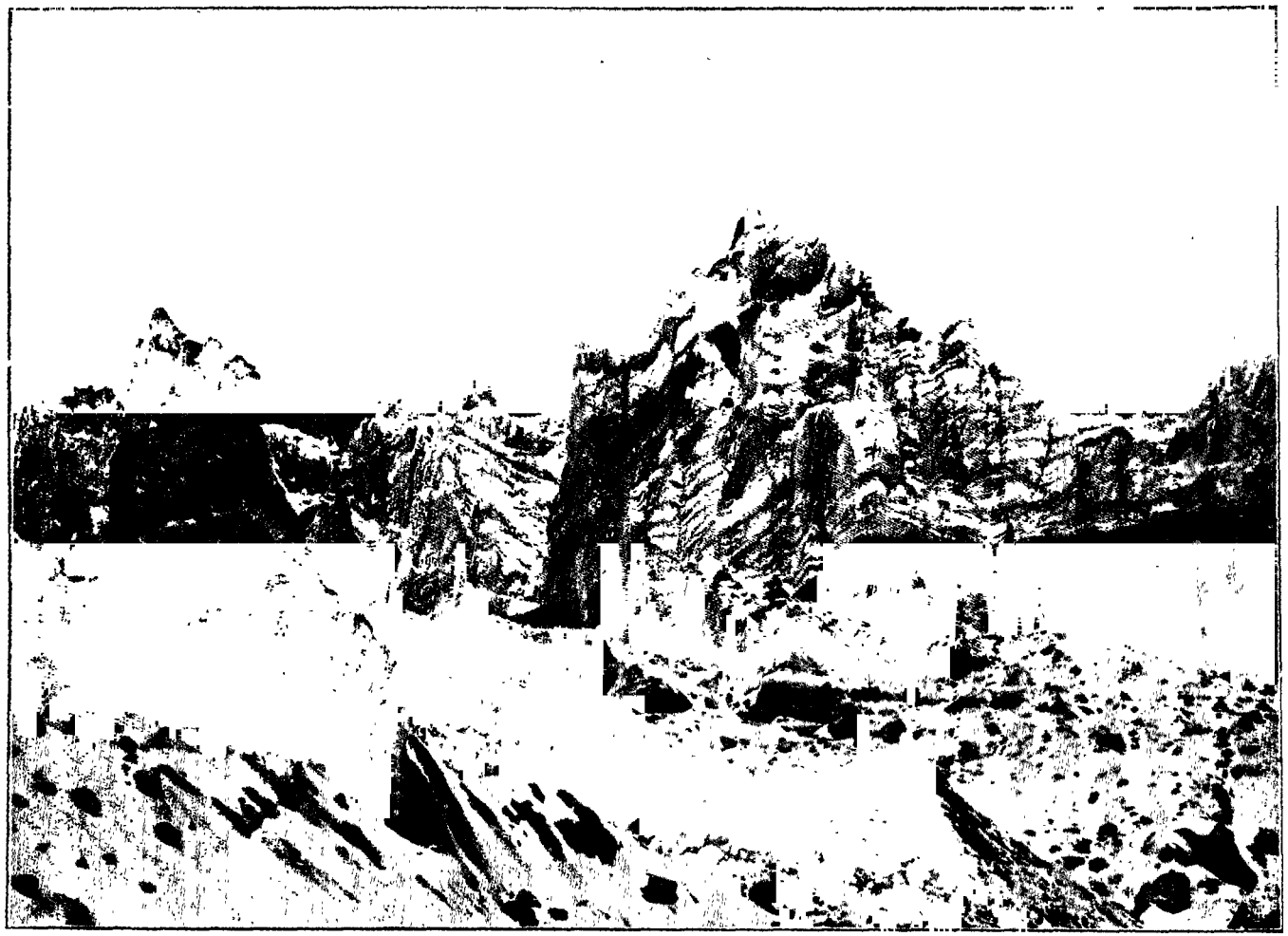
and came down into the valley bottom, where we set up our camp. Provisions for over a month had already been deposited here.

A few hundred yards away the front of the glacier stretched across the whole width of the valley, like a wave suddenly frozen at its height; a billow of foam, for the great wall of purest ice, rising well over 300 feet above a short moraine-covered slope, is deeply and intricately cut, slashed and scalloped everywhere. I have said that the end of the glacier is cut in two by a large medial moraine which marks the point where its two branches meet. This band of moraine projects somewhat into the valley beyond the line of the snout; and about 300 yards in front of it a flattened rock seems to recline in the middle of the valley (point 16,345 of the map), a good reference point for judging of changes in the glacier front. From the left half of the front, corresponding to the main branch of the glacier, issue two of the sources of the Shayok: streams of modest size but swollen and turbid, with lead-coloured waters; one of them flows between the edge of the glacier and the side of the valley, the other issues from the deep trough between this part of the front and the medial moraine. Innumerable smaller streamlets come out beneath the glacier all along the front, but the so-called door, the tunnel whence issues the principal regular outlet of certain glaciers, is here lacking. (See *Panorama A.*)

In the excursion I had made with Petigax two weeks before, for a preliminary examination of the glacier, we had tried to find a way of approach up the left side of the valley. In the lower part we found it covered with a layer of detritus ending in a vertical cut 300 feet high along the flank of the glacier, forming with it a narrow trough in which the marginal torrent flows. We cut across the steep slope, toiling up and down over the deep gullies dug by the water, towards a jut of rock that stuck out and cut off our view up the valley on this side. At our feet stretched the great glacier, intensely white, a perfect thicket of needles and peaks and pinnacles and towers; masses of every size and shape, divided by narrow clefts 60 to 100 feet deep or more, at the bottom of which we caught glimpses of the ice black with detritus, not fissured. These then were not true séracs, produced by cracks and fractures in the glacier, but forms shaped by fusion and by the erosion of the water, with such a variety of shape and line and drawing as to make one marvel. Sometimes the blocks were like large buildings in some fantastic architectural style; often ornamented with whorls and flourishes formed by the ice strata contorted into a thousand folds and waves. The imposing valley extended as far as one could see, describing a great curve to the north-west, as I shall describe later on.

After a mile or so our path was blocked by the jut of rock I have mentioned; we had to descend the steep and insecure slope to the bottom of the gully between the glacier and the side of the valley, where narrow passages and innumerable corridors opened among the fantastic shapes I have described. We went on among the detritus along the stream, here and there climbing over a boulder or block of ice; but after a little distance we were brought to a halt by a lake, small but deep, which lapped the over-

Ice pyramids and marginal lake, lower part of the Rimu.



Results of melting and erosion, in the lower part of the Rimu.

hanging rock on one side and the vertical wall of the glacier on the other. There was nothing for it but to turn back.

This reconnaissance, and the stations made by Wood on this side of the valley, enabled us to see in all its detail the range on the right, much better than we could do later by going along its base.

The way along the left side of the glacier being impossible, the only alternative was to try the other side of the valley, which we could reach by the great medial moraine which cuts the end of the glacier like a high-road—since it was unthinkable to try to find a way among the labyrinth of pinnacles on the surface of the glacier.

To reach the foot of the moraine we had to cross the valley at the base of the left half of the glacier front, and our first problem was how to cross the marginal stream. Our search for a ford was interrupted by a heavy snowfall, which paralysed us for two days and nights. Meanwhile, on the second day after our arrival at the foot of the Rimu, we had been joined by Jamna Prasad, who had finished his work on the gorges of the Shayok and their glaciers.

On July 6th the weather had mended, and a party of Ladakis moved a considerable number of loads to the boulder in the centre of the valley in front of the medial moraine. Next day Ginori left us to return to the base camp. For 4 days he had taken barometric readings every 4 hours of the day and night, synchronizing with those taken by Alessandri on the Depsang. At the same time the first caravan, led by Petigax, began carrying our material across the glacier, to the promontory at whose base the southern branch of the Rimu joins with the main glacier; Alessio and Abetti measured a base near the camp and made a station on the edge of the medial moraine; Jamna Prasad made a preliminary plane-table survey from a high station of the southern valley of the Rimu and its upper circus.

The air had become perfectly clear again after the snow-storm, with evenings of incomparable beauty. The luminosity of the eastern sky directly after sunset was most remarkable, as it had been on the Baltoro; only later did delicate sunset hues appear in the west. The needle points of the ice pinnacles stood out against a sky so deeply blue that it was almost black. Then all the spotless whiteness of the great basin was pervaded by the soft light of a full moon; the motionless mountains and valleys seemed to slumber profoundly in the immense quietude of the night.

In the last few days I had had collected a store of fuel from the little valleys behind the camp—*burtze*, and a dwarf tamarisk with its branches spreading on the ground—for the coolies' camps in the first stages on the glacier. On the 9th, accompanied by Antilli, I joined Petigax, who had remained on the right side of the glacier to receive and send back the transport caravans. Alessio and Abetti stopped at the lower camp another two days for the survey work.

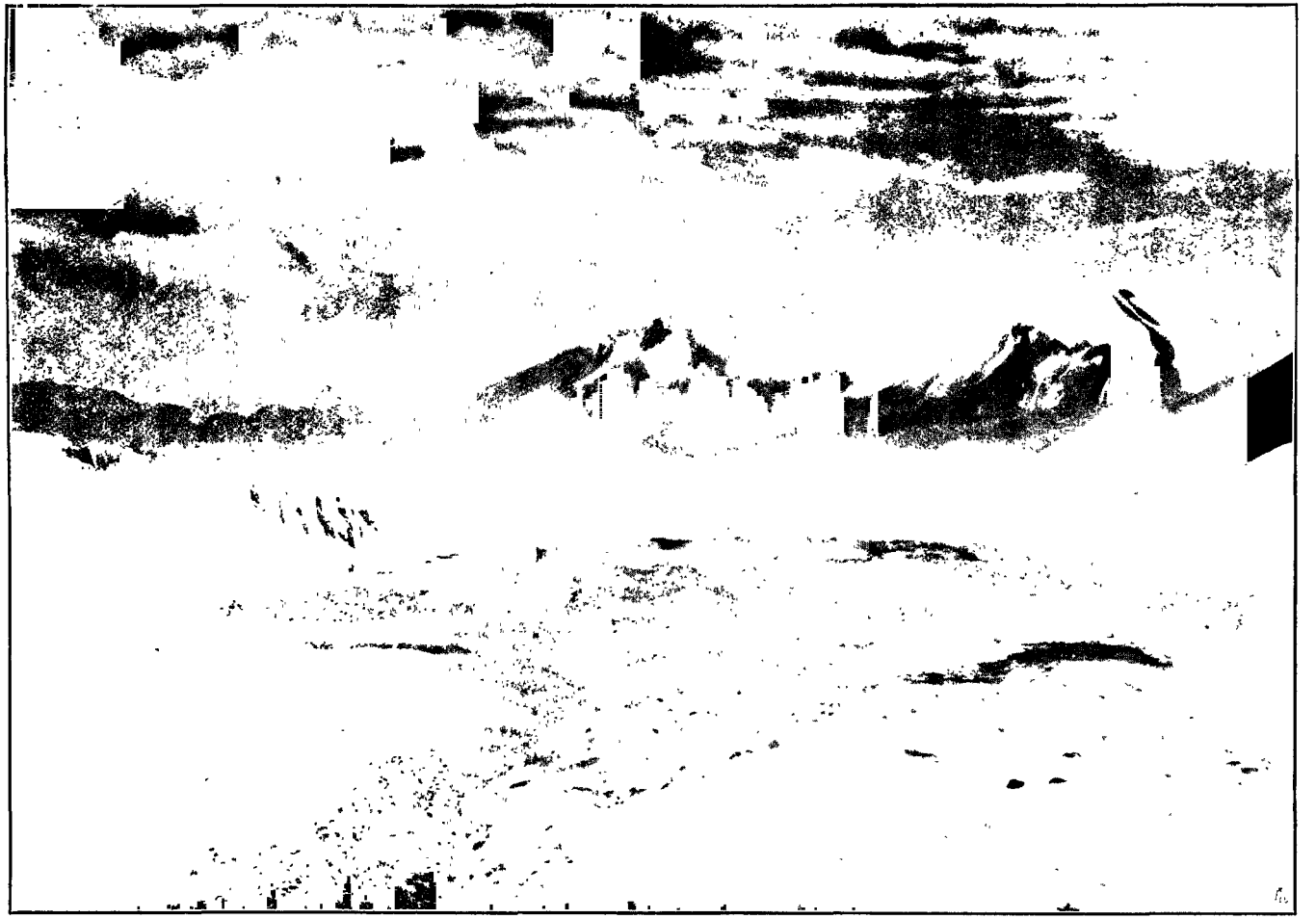
After fording the marginal stream, we walked along the rolling surface, covered with

moraine detritus and dotted with springs of water, at a short distance from the front of the glacier. Above us towered gigantic blocks of ice, in regular formation, like the prows of cruisers lined up for a review. Others, their bases eroded by melting, leaned over like hulks tossed ashore. The porters crossed the second stream, which issued by the side of the moraine, in order to reach the end of the latter where it slopes at an angle of about 30° projecting from the front line of the glacier. The top is 300 feet above the valley-level. We avoided crossing the second stream and entered among the blocks of ice by a route Petigax had found a few days before. It was most picturesque, and led through a labyrinth of passages to the great furrow between the bare glacier and the moraine. Down into this we went, and mounted diagonally up the other side, then filed directly upon the level moraine itself, which was very pleasant going, on ground formed of a layer of fine detritus upon a foundation of sand and mud which clung well enough to the ice beneath. There were few ups and downs, and those with moderate gradients. Now and then we skirted little glacial lakes. Melting was proceeding rapidly, and there was a constant dripping and a rolling of stones down the slopes. In about three hours we reached the base of the promontory at the end of the spur dividing the two branches of the glacier. Then we continued in a northerly direction in the large furrow between the right-hand side of the main glacier and the side of the valley; and a little farther on we found Petigax, on the spot he had chosen for the first camp on the Rimu. We were hardly 650 feet higher than the foot of the glacier, in a widening of the furrow between the glacier and the mountain-side; an ancient abandoned marginal moraine separated us from the steep flank of the glacier, covered with a thin layer of detritus, above which rose the peaks of the séracs. Beyond the moraine flows a small marginal stream ending in a little lake, at the foot of a typical morainic cone, perhaps 150 feet high, which certainly did not seem to be caused by pressure, since the glacier was backed up against the other side of the valley and the cone was on the extreme right edge of the glacier, at least 200 yards away from the mountain-side.

The afternoon was clear, warm and windless. The porters put down their loads, took off their woollen shirts and squatting on the ground with their backs bare, began assiduously to pick off the lice. Obedient to the first precept of the Buddha not to take the life of any living creature, they tossed the little insects on the stones around them; "*sinent se religionis causa a pediculis aliisque infestis animalculis vellicari*," as Giorgi has said.[1] In this camp we stopped for three days, to give time for the party to assemble and for the men to bring up provisions for a month. The weather had become as capricious as on the Depsang.

The path from now on was very easy and not at all fatiguing, ascending the valley at a mild gradient, at first in the trough between the glacier and the valley wall, and then on the living marginal moraine. Beside us lay the glacier, all broken into shining blocks as white as cream, lying in great transversal waves. Its appearance is almost exactly

[1] *Alphabetum Thibetanum*, p. 457.



Right-hand marginal moraine and morainic cone near our first camp.

that of the Seward glacier in Alaska [1]; they both flow in valleys so wide and open as to dwarf the ranges that close them in. On the other hand, the Rimu is very different from the other great glaciers of the Karakoram—the Hispar, Biafo, Baltoro—which are cyclopean corridors between great precipitous walls thousands of feet high, and are entirely covered, at least in their lower course, by the black stony layer of the diffuse moraines. The Rimu is quite open to the light, which it reflects in the spotless purity of its séracs; and though much smaller in size than the other glaciers, it gives the impression of being much vaster. From the illustrations of Longstaff and the Workmans it would seem that the Siachen, situated between them and the Rimu, has an intermediate character. (See *Panorama A.*)

On the left of the glacier extends a range of bare mountains, with neither snow nor ice and with but one valley cutting deep into it, likewise empty. Only at the northern end is a great peak (20,910 on the map) covered with glaciers. But the chain on the right side, which we were following, is formed of a series of massifs, covered with ice and separated by deep valleys filled with tributary glaciers. There is here an even sharper contrast than that already noted on the Depsang, between the mountains on the east and those on the west: and it is hard to believe that the peaks on either side of the great valley are almost equal in height, as the survey revealed them to be.

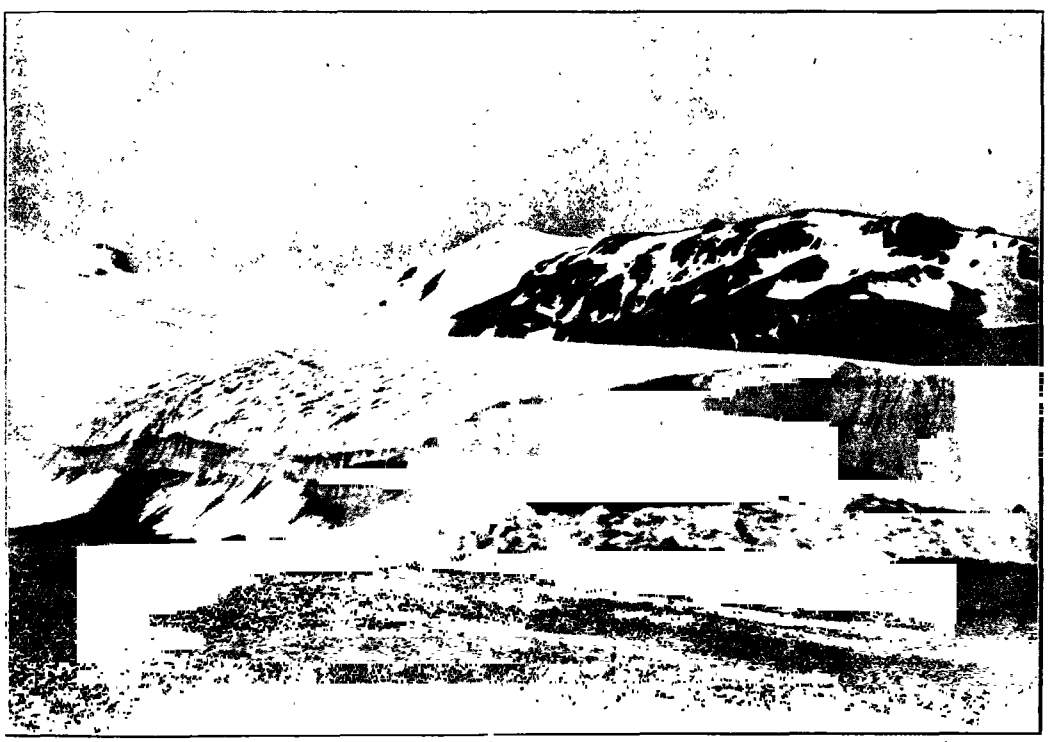
Not far above the site of our first camp a first little glacier came down from a tributary valley, ending in a thick round swollen tongue, about 300 yards from the marginal moraine of the Rimu. Then a second, larger glacier, pressing out as far as the moraine, a third and then a fourth, which reached the edge of the main glacier, ending with a high abrupt step, at the base of which were heaped up great pieces of ice broken off from the front.

The moraine we were marching on was now dotted with little lakes full of muddy water, and small streams which disappeared in ice tunnels. On the glacier beside us the blocks gradually became smaller and less crowded, finally disappearing. The unbroken surface, without any crevasses, has great transversal waves, in which rivulets flow, or water stands in pools. It was a surprise to see so much water; certainly the streams issuing at the front of the glacier seem disproportionately small compared with the size of the basin whence they come.

We set up our second camp in front of the fifth right-hand affluent of the Rimu, in a dip in the moraine, near another large cone, 17,565 feet above sea-level. We were at the centre of the great arc made by the glacier as it turns north-west; expanding into a basin over three miles wide, like a frozen lake, flat and motionless, without visible cracks, and without moraines. On the north of this basin the mountains are broken by a gap, a mile and a half wide, across the threshold of which extends a slender morainic fin. Through this opening a tributary comes into the basin, which by reason of its size seems like a third branch of the glacier. Evidently the watershed was not on the imposing

[1] Compare the illustrations to those in Chapter VI of my *Mount Saint Elias*; London, 1900.

range which forms the left side of the principal trunk, but beyond, in the mountains visible beyond the doorway I have described. We quickly decided to take to this branch of the glacier, in order to fix first of all the position of the watershed, returning afterwards to the exploration of the main valley; and on July 15th we set out to traverse the great curve of the glacier, toward the opening between the mountains through which the northern tributary entered the basin. After crossing the narrow zone of irregular ice near the moraine, we proceeded on the even surface, which was split up into minute scales,



The fourth tributary glacier on the right side of the Rimu.

pockmarked by pools of water and crossed here and there by rivulets. In some deeper hollows towards the middle of the basin several glacial lakes had collected. From this point we had a wonderful view of the basin. Below us, to the south, Longstaff's Depsang Peak (peak 22,750) seemed to rise on the horizon of the vast expanse of ice; westward stretched the upper part of the glacier, up to a step, above whose edge just showed the peaks of the upper basin. The right side of the valley, forming the intermediate range between it and the southern branch of the glacier, was ice-covered, with deep cuts between the complicated massifs and great tributaries flowing into them. Beyond these,

that of the Seward glacier in Alaska [1]; they both flow in valleys so wide and open as to dwarf the ranges that close them in. On the other hand, the Rimu is very different from the other great glaciers of the Karakoram—the Hispar, Biafo, Baltoro—which are cyclopean corridors between great precipitous walls thousands of feet high, and are entirely covered, at least in their lower course, by the black stony layer of the diffuse moraines. The Rimu is quite open to the light, which it reflects in the spotless purity of its séracs; and though much smaller in size than the other glaciers, it gives the impression of being much vaster. From the illustrations of Longstaff and the Workmans it would seem that the Siachen, situated between them and the Rimu, has an intermediate character. (See *Panorama A.*)

On the left of the glacier extends a range of bare mountains, with neither snow nor ice and with but one valley cutting deep into it, likewise empty. Only at the northern end is a great peak (20,910 on the map) covered with glaciers. But the chain on the right side, which we were following, is formed of a series of massifs, covered with ice and separated by deep valleys filled with tributary glaciers. There is here an even sharper contrast than that already noted on the Depsang, between the mountains on the east and those on the west: and it is hard to believe that the peaks on either side of the great valley are almost equal in height, as the survey revealed them to be.

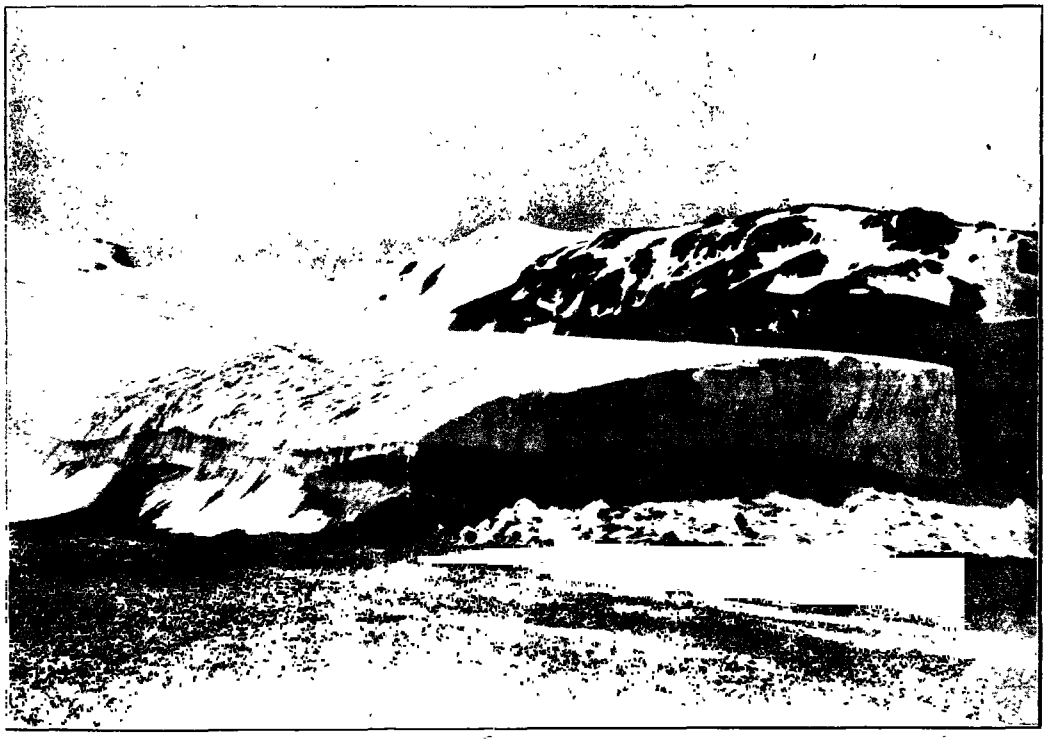
Not far above the site of our first camp a first little glacier came down from a tributary valley, ending in a thick round swollen tongue, about 300 yards from the marginal moraine of the Rimu. Then a second, larger glacier, pressing out as far as the moraine, a third and then a fourth, which reached the edge of the main glacier, ending with a high abrupt step, at the base of which were heaped up great pieces of ice broken off from the front.

The moraine we were marching on was now dotted with little lakes full of muddy water, and small streams which disappeared in ice tunnels. On the glacier beside us the blocks gradually became smaller and less crowded, finally disappearing. The unbroken surface, without any crevasses, has great transversal waves, in which rivulets flow, or water stands in pools. It was a surprise to see so much water; certainly the streams issuing at the front of the glacier seem disproportionately small compared with the size of the basin whence they come.

We set up our second camp in front of the fifth right-hand affluent of the Rimu, in a dip in the moraine, near another large cone, 17,565 feet above sea-level. We were at the centre of the great arc made by the glacier as it turns north-west; expanding into a basin over three miles wide, like a frozen lake, flat and motionless, without visible cracks, and without moraines. On the north of this basin the mountains are broken by a gap, a mile and a half wide, across the threshold of which extends a slender morainic fin. Through this opening a tributary comes into the basin, which by reason of its size seems like a third branch of the glacier. Evidently the watershed was not on the imposing

[1] Compare the illustrations to those in Chapter VI of my *Mount Saint Elias*; London, 1900.

range which forms the left side of the principal trunk, but beyond, in the mountains visible beyond the doorway I have described. We quickly decided to take to this branch of the glacier, in order to fix first of all the position of the watershed, returning afterwards to the exploration of the main valley; and on July 15th we set out to traverse the great curve of the glacier, toward the opening between the mountains through which the northern tributary entered the basin. After crossing the narrow zone of irregular ice near the moraine, we proceeded on the even surface, which was split up into minute scales,



The fourth tributary glacier on the right side of the Rimu.

pockmarked by pools of water and crossed here and there by rivulets. In some deeper hollows towards the middle of the basin several glacial lakes had collected. From this point we had a wonderful view of the basin. Below us, to the south, Longstaff's Depsang Peak (peak 22,750) seemed to rise on the horizon of the vast expanse of ice; westward stretched the upper part of the glacier, up to a step, above whose edge just showed the peaks of the upper basin. The right side of the valley, forming the intermediate range between it and the southern branch of the glacier, was ice-covered, with deep cuts between the complicated massifs and great tributaries flowing into them. Beyond these,

Marginal moraine, right side of the lower Rimu.

at the head of the southern branch, Peak 24,240 was just visible. By contrast, the left side was black rock, with its mountains only partially ice covered. In front of us it was broken into by the strange aperture by which the northern tributary enters the basin, swelling a little, wavelike, as it crosses the narrow passage. We could tell nothing about the valley whence it comes; it seemed to run both west and east. (See *Panorama B.*)

In about two hours we reached the strip of moraine which stretches across the confluence of the northern tributary. The moraine is a few feet lower than the general level

Our second camp on the right-hand marginal moraine.

of the glacier; on the north it falls precipitously some 60 or 70 feet, opposite an ice wall of the same height, behind which extends a perfect polar landscape in miniature. A small glacial lake, with an irregular shore line full of fiords and inlets, had partly emptied itself, leaving stranded a picturesque disorder of ice-blocks and fragments of ice tables which had floated on it. We set up the tents and sent the porters back at once to the second camp to fetch the remainder of the baggage. We intended to explore the sources of the glacier—lightly equipped, to avoid the need for two trips to bring up our things.

The gateway through which flows the northern branch, at the threshold of which we were encamped, is as I said about a mile and a half wide; beyond it is a corridor, a

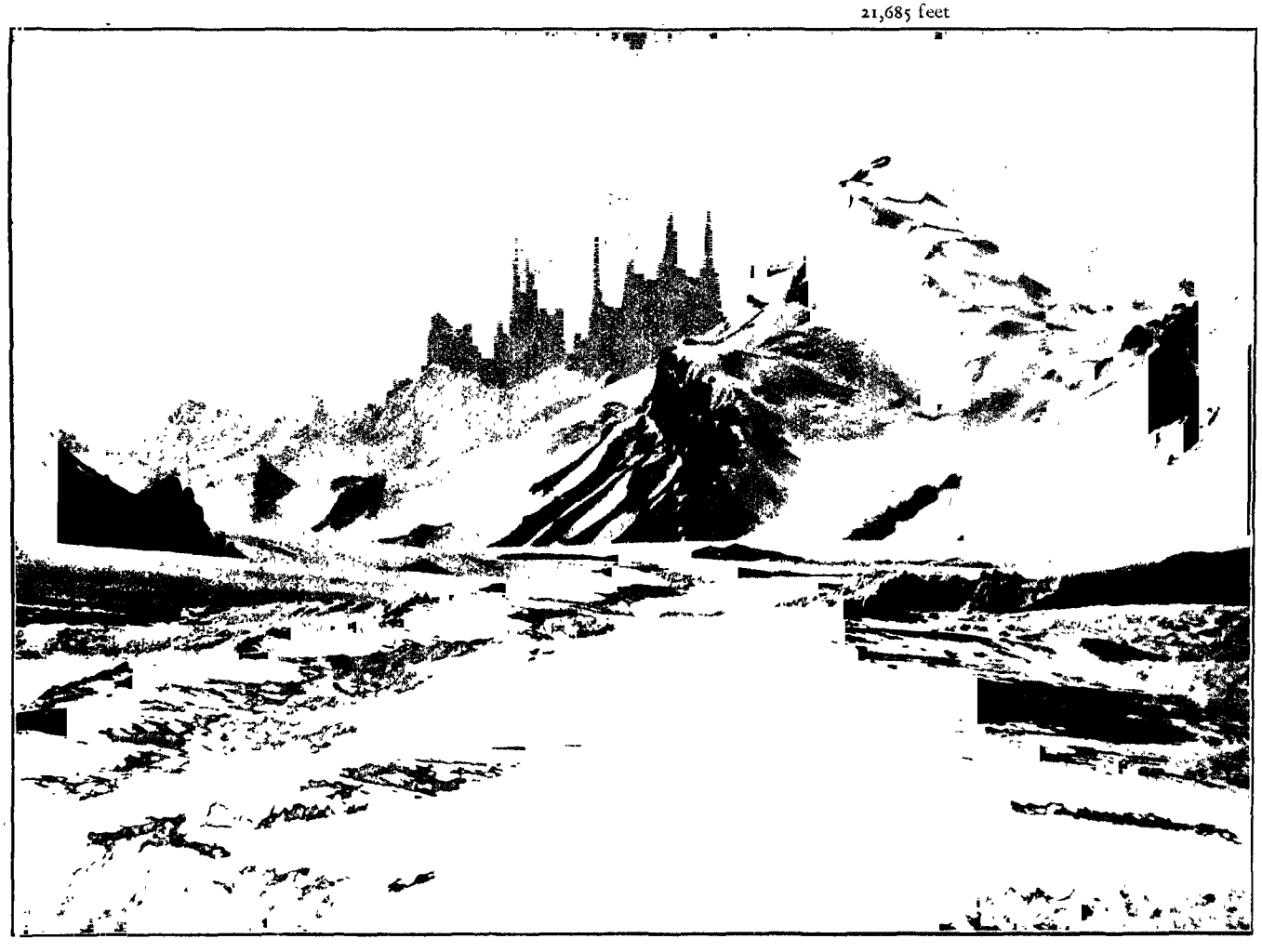
little narrower and about two miles long, between two mountain massifs with small glaciers on their slopes ; on the west was a big ice-dome 20,700 feet high, on the east two peaks, one of yellow rock, 20,910 feet, the other snowy, 20,805 feet. (See *Panorama.*)

Alessio and Abetti with Antilli, Jamna Prasad and Petigax were to make a topographic and photographic station on the ridge of one of the spurs to the east of the corridor, which promised to give an extensive view of this northern branch of the glacier

Telephotograph of Depsang Peak (22,750) from the central amphitheatre of the Rimu.

and of the ranges enclosing the Rimu basin. I was to proceed on the glacier, leading the porters to the base of the same spur and looking for a suitable spot to camp in the valley that opened behind it. We set out together. Petigax took us down the north side of the moraine and across the bed of the ancient lake, strewn with large séracs, from which we reached the back of the glacier.[1] We proceeded obliquely toward the rib of

[1] In the summer of 1930, Dainelli found this strip of moraine, at the junction of the northern with the main branch of the Rimu, completely submerged by the swollen glacier, which had also filled up the depression to the north of it.



Chain on the left side of the upper Rimu.

black rock on the east; when we reached it the survey-party began their climb towards the spot chosen for the station, distinctly marked by a sort of pyramid which looked like a signal, while I continued with the porters on the bare unbroken glacier sloping northward. In turning the corner the glacier swelled up at the foot of the rock I was approaching, and for some distance was covered with séracs. I passed at some distance from the spur to avoid the broken ice, straining my eyes to discern the shape and direction of the valley on the east. For some time I had been able to see all that part lying west of the gate of communication with the Rimu: it was wide, but not very long and led up to a basin surrounded by moderately high peaks, with tributaries that looked too small to feed so large a glacier. It was reasonable to suppose that another branch of smaller proportions came to meet it from the east, both flowing together into the Rimu. But, on rounding the corner at the mouth of the glacier, to my great surprise I saw it flowing downhill in a north-easterly direction, with a thick offshoot which two miles below ended in a flat valley, where one could see a winding emissary.

In other words, this northern branch of the Rimu, flowing into a large valley nearly parallel to those of the main branch and of its southern tributary had actually two outlets, through two cuttings in the ranges, the larger toward the south and into the Rimu, the smaller toward the north-east. Whither did this second one lead? To all appearance, into a valley running northward, in other words belonging to the northern slope of the Karakoram; so that the watershed would be interrupted here, and the glacial system of the Rimu pour its waters on either side of it: by the Shayok and the Indus into the Indian Ocean, by the valley which had just revealed its origin into the great enclosed basins of Central Asia.

Nothing loth, without thinking twice I set off towards the new valley. On my right a glacier flowed down the yellow steps of Peak 20,910, ending in a high front without traces of moraine, a few yards from the side of the offshoot of the Rimu. On my left a big cone of red rock (20,685) rose above deeply cut, empty valleys. In an hour I reached the snout, about half a mile broad, ending in a slope of ice, which I descended without difficulty[1] and stood once more upon the bare soil (17,460 feet). Several moderate-sized streams issue from the glacier. About a mile and a half below the snout the valley receives a large tributary on the left. I set up camp on the corner between the two. Opposite the mouth of this tributary twin glaciers come down, of the same size, from the same height, both ending upon a delta at a distance from the valley bottom:

[1] During his expedition in 1930 to the Siachen and Rimu glaciers, to which I refer more particularly in Chapter XIV, Dainelli came out of the Rimu into the Yarkand valley and found the whole of this front of the northern branch ending in a sheer wall of ice, much like that part of it which is illustrated on p. 376. He was obliged to seek a passage on the slope to the right of the glacier and down the rocks enclosing the front on this side (see *Boll. R. Società Geog. Ital.*, Vol. VIII, 1931, p. 30). But his statement that in 1914 the glacier ended in a thin and regular tongue (p. 35) does not agree with its actual appearance at the time as shown by our illustrations.

the upper one with a vertically cut snout, at the foot of which was a fringe of broken ice, without any sign of moraine; the lower one with a typical high frontal moraine.

Below the glacier stretched the wide flat valley, covered with red and yellow detritus, with small fragments of limestone and schist. The valley runs north-west, narrowing as it goes. Here and there were patches of greenish grass, with tiny flowering plants and a butterfly or so.

Offshoot of the northern branch of the Rimu, the source of the Yarkand river.

After a short rest I proceeded to explore the tributary valley that opened beside the camp: within it flowed a swift, dark and silent stream, fed by a big hanging glacier which covered the northern slopes of Peak 20,685, and by another glacier, lying on a saddle at the head of the short tributary valley. It was too late to get that far, and I returned to camp to greet the rest of the party as they came back from the station. They brought news which was not least of the surprises of that surprising day. They had found a pyramid of stones—the same which from below we had taken for a monolith—and other indubitable signs of the passage of Wood and Spranger, who had made a

station in the same spot, thus perfectly linking up their survey with that of Alessio and Abetti. Wood's party had crossed a low saddle to the south and west of the Karakoram pass, and reached a large valley extending northward. By following this, they had come directly upon that offshoot of the Rimu, ten miles and a half above, only two days before our arrival on the same spot. (See *Panorama D.*)

Spranger will relate how they recognized in that valley and the stream which flowed

The first left-hand tributary of the Yarkand, near its source.

in it the upper course of the Yarkand river, the source of which, accordingly, is the northern branch of the Rimu glacier. Later they ascended the principal tributaries of the Yarkand, completing the map of its entire upper basin. I shall speak further on of the significance of this discovery in relation to the geography of the region. The topographical work kept us a day at this camp, surrounded by limestone peaks in tones of warm red and yellow, which the sunset deepened to golden and blood-red. The porters had found a dry plant which they could use for fuel, and they gathered bunches of pale lilac asters for us.

We set off again on July 19th, going straight up this arm of the Rimu along its left-hand side. At first Alessio and Abetti, with Petigax, kept to the centre of the glacier, to ascertain the height of the point where it slopes toward its two outlets—18,030 feet. The air was thick—with what appeared more like suspended dust than mist. For large areas the glacier was covered with stagnant water, which was crusted with thin ice that sometimes broke underfoot and let one in half-way up the leg. Farther on the way was cut off by fairly large streams of water, which we crossed on the shoulders of the porters. We moved toward the base of a spur running out from the left side of the valley, hoping to find there a suitable place for camping. We passed the mouth of several tributary glaciers which came down on this side between the rocky spurs; but the larger affluents were on the right side, enclosed by magnificent groups of mountains, with deep bays and ice-filled valleys. Buttresses of limestone form the gateways to the valleys, and at the same time a most effective and picturesque foreground to the snowy mountains and glacial basins behind them. The slope of the glacier was moderate. A deep trench with a stream in it ran between the glacier and the left side of the valley; there was no lateral moraine. We reached the promontory, which afforded no place to set up the tents; beyond it, after a pronounced undulation in the surface of the glacier, followed by a steeper grade, we found ourselves—at about 18,540 feet—at the snow-line, in deep soft snow. The upper glacier went on to a broad, rounded saddle, at what was obviously the head of the valley. A little island of schists 100 feet high stood up in the middle of the glacier; we climbed on it and there pitched our tents. It was a very narrow space to accommodate us and our men—but there was nothing else for it. We had covered over 6 miles in 5 hours, having mounted only 1,180 feet vertically from the end of the glacier.

Porters arriving at our camp on the left-hand edge of the northern branch.

It took us two hours, next morning, to reach the saddle on the watershed. The glacier was covered with snow, not very deep, with here and there patches of bare ice; there was the glitter of water everywhere. Big tributary glaciers came down from both sides; higher up the left side curved away to enclose a huge circle of glaciers surmounted by peaks not much higher than they; these must be the principal source of this branch of the Rimu. The terminal saddle opens out to the west, 19,385 feet above sea level; there is a flat surface of about 200 yards between the two slopes. On the other side a deep, narrow valley descends steeply, losing itself to view between the spurs that

run down from the precipitous walls, the left side covered with glaciers, the right side rocky. South of the saddle, opposite the widening on the left of the glacier, is an extraordinary formation, a great vertical wall of red rock, curved in a regular semicircle, 2,000 feet high, topped by ice and a snow cornice. The level glacier fills the bottom of this hollow. We had reached the saddle early, but the air was so thick that we could only see the near-by mountains. We prepared for a long wait upon the snow. At last, more than 4 hours later, we began to get glimpses of the details of the landscape, and it became possible to make two stations. In the afternoon, when the snow was soft and water-soaked, we returned to our camp on the isolated rock on the glacier. The sky was overcast. We had still to survey part of the upper basin of this branch, and it was arranged that Jamna Prasad should go up again from the camp to complete the work; but it snowed all the next day and nothing could be done.

Marginal lake below the upper circus of the Rimu.

On July 22nd there was hope of better weather and we set out to descend the glacier again, leaving Jamna Prasad with his tent and a few coolies to rejoin us after finishing his work. We crossed the glacier diagonally to its junction with the Rimu, where our third camp had been; walking all the time in soft snow and through puddles of water. Here we stayed a whole day to give Jamna Prasad time to rejoin us, and to prepare for the exploration of the upper part of the main Rimu glacier.

We were off again on July 24th; following the left-hand margin of the glacier at the foot of a long wall of bare rock, then across the snout of a broad tributary which comes down from the great Peak, 21,865. Above the junction of the tributary glacier, between it and the foot of a big spur projecting into the valley, a long marginal lake had collected, full of floating ice. The flank of the Rimu, covered with moraine detritus, sloped gradually to the edge of the lake. We made our sixth camp in this little bay, at 18,255 feet above the sea. Up to this point the glacier is level and even, bare of snow, with a few surface streams, not broken by any crevasses. From the centre of the great bend where the northern branch comes in—a distance of 6 miles—it rises scarcely 650 feet. But level with the spur at the foot of which we had put our camp, the glacier swells into a great hump, scored by large curving crevasses and gaining another 300 feet of height. Here, at about 18,500 feet it—like its northern branch—was snow-covered. Above this hump the upper basin of the glacier opens out. On the right of the valley stands the magnificent range separating it from the southern branch

of the Rimu, covered with great glaciers which flow in valleys that penetrate far away into the range, so deeply cut at their junction with the main valley that they seem like fiords or bays, filled by off-shoots of the glacier. (See *Panorama C.*)

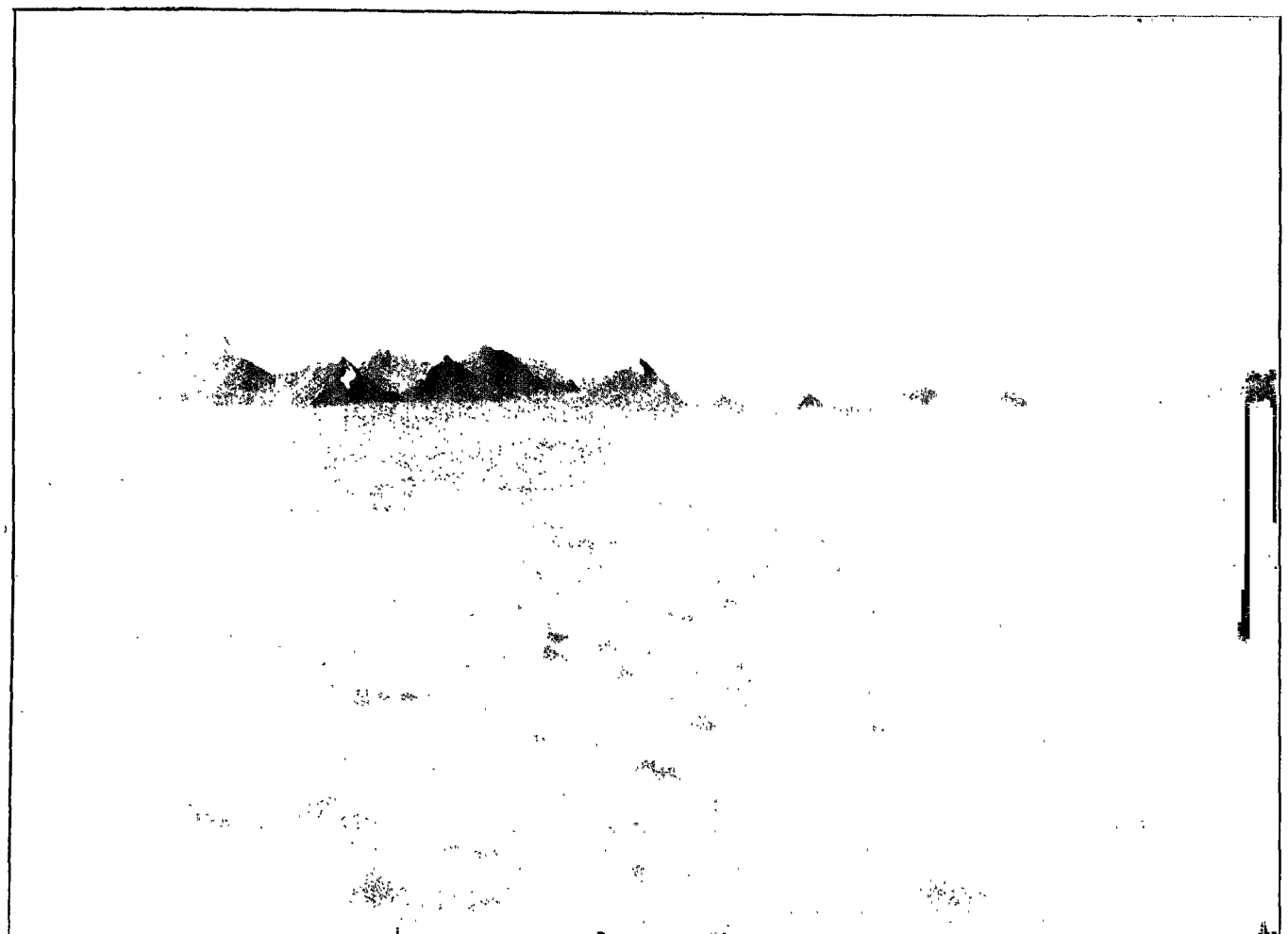
Next day, in the early hours of the morning, we climbed the fissured hump of the glacier by following round the base of the southern spur of Peak 21,865. Just before we reached the top Alessio and Abetti with Petigax and Jamna Prasad made a station toward the centre of the glacier; roping themselves because of the large cracks with snow bridges. I continued with Antilli along the left side, keeping close to the coolies; but the treacherous snow-covered crevasses so increased in number that we formed an advance guard, roped, with the remaining coolies following in our footsteps. We had taken a timely precaution; yet it proved not to be sufficient: for a little farther on one of the coolies broke through a bridge and disappeared. We were recalled by the cries of his companions and were at once by the crevasse. Fortunately the crack was narrow, the walls straight and not hollowed out. The man was wedged into the narrow space, 20 or 25 feet below the surface. We let down a rope which he seized but did not succeed in tying himself because of the cramped position. I asked for a volunteer and a man from Kargil consented to be let down with the rope. A little later we drew up the load the man had been carrying, luckily a large soft sleeping-bag, which broke his fall, then the man himself, lastly the friend who had gone down to rescue him. The victim, by great good luck, was unharmed, save for a slightly twisted knee, which needed only an elastic bandage and a little rest. I sent him back to camp with two porters. Meanwhile we had been joined by the survey party, and we roped ourselves in three groups, a long and troublesome operation, as we had 30 coolies, none of whom had been roped before.

The accident, and the strict attention we had to pay to our way, distracted us somewhat from the scene we had before us directly we got over the hump of the glacier. We had arrived at its vast upper basin. Into it flow two great rivers of ice from the south. On the west the head of the glacier was not enclosed by a continuous mountain range but by a series of rocks and ice-covered cones which from this side looked isolated, like the peaks of mountains rising above the glacier which had filled the basin to the brim. Behind them was the large valley of the Tarim Sher, one of the principal tributaries of the Siachen, reached by a pass that opens between these little summits and a low spur, mostly ice-covered, at a height of about 20,340 feet above sea-level.[1]

Toward the north the basin widens out, outlined by a great arc of mountains, not more than 1,000 feet above the glacier, among which one could see the opening of a pass, which in all probability was on the Karakoram watershed.

The entire glacial basin was scored by crevasses running in every direction, showing here and there through the scanty covering of snow that did not even support the foot. Petigax felt that it could not be crossed without risk, with the snow in that state.

[1] Compare the observations made by Dainelli in 1930, as reported in Chapter XIV.



Upper circus of the Rimu glacier from a point between Camps VI and VII.

We went a little distance along the left side of the basin, almost to the middle of its northward curve, stopping in a hollow relatively free of cracks, 19,345 feet above the sea, and set up the tents on the snow. We kept only ten coolies for the survey work and sent the others, roped, to the lower camp.

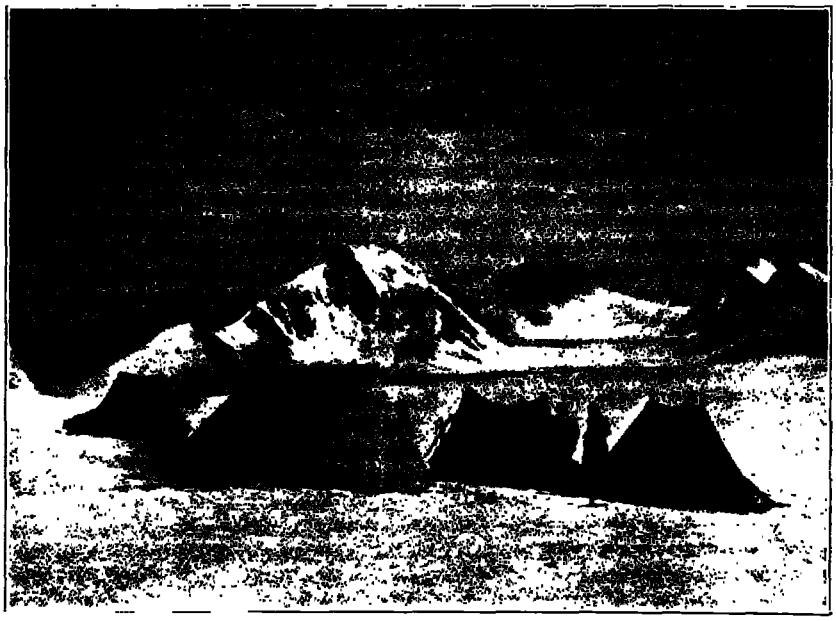
It was like being on a plateau: we had round us a vast expanse of snow with a satiny sheen. The higher mountains had been wrapped in cloud all day, and this now began little by little to cover the whole sky with a light veil; some sleet fell. It was the insidious beginning of bad weather, catching us just when we were at our goal. It continued to snow, at frequent intervals, by day and night during the 26th, 27th and 28th.

Saddle leading to the Siachen.

We lost no chance to make the survey of the upper basin of the Rimu; bit by bit it was completed. On the 26th the surveyors were away all day, ascending the left side of the basin for two hours of good walking. On that day Dainelli and Marinelli arrived, setting up their camp a little above ours and leaving again next day. Dainelli describes in the next chapter their peregrinations on the plateaux east of the Depsang, in the Shayok valley, across the Rimu and in the upper Yarkand valley. On the 27th it was again possible to do a little survey work: Alessio, Abetti, Antilli and Jamna Prasad were all stationed for hours round the tachymeter, the photographic camera and the plane-table, set up in the snow ready to seize on details of the terrain through any short-lived break in the changing clouds and through the mists. Nothing could be done on

the 28th. More snow fell, gradually deepening the layer formed in the preceding days, and we could not see a hand's breadth before us. The mild air and complete stillness did not encourage expectations of an early change.

The hours passed slowly, idle as we were and prisoners within our little camp. The porters were afraid of the cracks and had put their tents back to back with ours. One could not step outside the tents without sinking up to the knees or farther in snow; our feet were numb, our faces burned with the stinging and scorching reflection of the white mist on the new fallen snow; the air was translucent, as though made of ground glass. There was not a moment of the day when one felt at ease. To add to our preoccupations,



Our camp in the upper circus of the Rimu.

one of the coolies had been ill since we reached this point—the only Balti we had left, a stout volunteer—who was suddenly taken with alarming symptoms: violent colic, closed bowels, vomiting and hiccups, with a feeble pulse and general depressed condition, all signs of intestinal paralysis. He recovered in a few days under a treatment of hot poultices and caffeine.[1]

The day after we reached the upper camp we had sent down 16 coolies to fetch

[1] One of Wood's porters fell ill on the Karakoram pass, with similar symptoms, and succumbed in a few hours. Schlagintweit, it seems (*op. cit.*, Vol. III, p. 287), had already noticed that the Tibetans are subject to serious constipation, lasting even ten or fourteen days. The condition is not due to opium, which is not in use in Ladak.

provisions and supplies. We had not much left; the weather got worse from day to day and it seemed impossible that the coolies would find our little half-buried camp, in this thick weather, with no tracks in the deep snow. We decided to go to meet them, at least as far as the next camp below, by the lake, and return hither reprovisioned directly the weather improved. We covered the short distance on July 29th, leaving all the instruments in one of the porters' tents. We had a hard time striking camp; the porters were so stiff they could scarcely move. One after the other we dismounted the tents and folded the frozen canvas as best we could, gathered up the snow-shoes, the poles and tent-mallets and many other objects buried under the snow. The sick man was shifted from tent to tent and finally seated on the loads. He was rather better and not in pain. By the aid of caffeine and the support of two coolies he was got down in fair condition. Every trace of the well-trodden path we had made coming up was gone, the mist was thick. In silence Petigax led us among the cracks. And behold, almost at the end of the march, we met ten of our porters, coming up laden. It was truly admirable, the way they had set out so faithfully and bravely, without a guide or a path, in the snow and mist. They told us that the whole glacier as far as the big bend to the south-east was covered with snow.

We stopped at the 6th camp for another five days, unable to do anything, while the weather grew steadily worse. Gradually we lost hope of reaching the passes on the terminal ridges of the upper basin. And now the snow was accompanied by sudden whirling gusts of wind that caught and spun and scattered the flakes and made the tent canvas rattle. The little lake froze over. Hardest of all to bear were the false hopes roused by a sudden clearing, generally at sunset, that always proved delusive. The several little bands of porters dispatched to the lower camps returned one after the other. They spent the days squatting in their tents, making tea on the paraffin stoves we had given them.[1] In the mist, the space and solitude about us seemed boundless. In our camps on the Rimu we had seen nothing of the choughs which followed us so persistently on the Baltoro and the Bullock-Workman expedition on the Siachen—perhaps because they were feasting on the Karakoram route.

The moraine on which we camped, like everything else, was covered with a uniform white mantle and snow continued to fall. I read in Petigax's silence that he was beginning to think of the return, with the whole camp to transport in the snow that each day grew deeper on the glacier; and I felt uneasy. By this time all hope had fled of resuming work on the upper basin; but we had to go back to get the instruments. On the afternoon of August 2nd, during an interval in the storm, 10 of our best men went up the

[1] It is strange that none of all the previous expeditions to the Himalayan glaciers thought to provide the coolies with paraffin stoves to cook on. Memories of the difficulty we had, on the expedition of the Duke of the Abruzzi, carrying up wood to the upper camps on the Baltoro had made me bring two stoves with wide wicks, holding a quart of paraffin, much easier to manage than the Primus stoves. Half a gallon of paraffin a day sufficed to cook food for 30 men.

glacier. The snow began again before evening, and fell all that night and the next day, dense and heavy, without a moment's respite. By late afternoon the party returned from the high camp, relieving me of an anxiety that had gnawed at me from the moment they set out. They brought back the instruments and tent we had left 6 days before, and they were all safe and quite sound except one who had a headache and coughed and spat blood: passing phenomena only, due to the altitude.

Next day, August 4th, the 12th since we had come, we definitely turned our backs on Camp VI. The sleet, driven by a biting wind, lashed our faces and made very painful the work of breaking camp. The men were too numb to help very much. It took us two hours to put the loads together as best we could; and we got under way, leaving the good Jamna Prasad to follow with the coolies. We had to cross the glacier diagonally to reach the site of our old second camp, on the right marginal moraine. There were nearly 2 feet of snow, and as the middle of the glacier was unknown territory to us it was wise for the advance-guard party to proceed roped—a long and exhausting march in the deep snow, for the first hours in mist, which later lifted to display a sky heavy with clouds.

This lifting of the mist revealed to us a most novel scene: we seemed all at once to have fallen into the dead of winter. As far as the eye could see, the slopes, ridges and glaciers were covered with the uniform mantle of new-fallen snow. When we had got down far enough to be able to look toward the south-east, beyond the curve of the glacier, we saw that the lower part looked just the same, as also the slopes enclosing the Shayok valley at its head; all were snow-laden, while the slope rising to the Depsang seemed one vast glacier. It was most fortunate that we had been able to see the Rimu basin in its normal summer state during the first days of the exploration, for now it was impossible to make out the limits of the glaciers, or to distinguish the rocky from the snowy slopes, the valleys with glaciers from those without.

We reached the right side of the glacier and found the snow a little less deep on the marginal moraine. It was near sunset. The western sky was covered with great bands of cloud which gradually collected into an immense belt behind the peaks at the top of the glacier. The declining sun gilded the thick vapours and the mountains stood out in transcendent loveliness against the light. Such sights were a little consolation for the bad weather. We reached camp shortly before seven, having taken 10 hours to descend 8 miles of glacier. The camp consisted of nothing but the kitchen tent, which we had left here on our way up, and another small tent which for some days now had been sheltering the Kargil porter who had fallen into the crevasse and the Balti taken ill in the upper camp. We were all very tired and hungry. Two hours later the coolies began to straggle in—for the first time exhausted and singly or by twos. The last arrived at midnight—and then one was missing, a Ladaki no longer young, who had probably yielded to fatigue and drowsiness, not knowing his danger. The rest of the party, scattered on the glacier, had not realized his absence. It had begun to

snow hard again, and at this hour of the night we could do nothing. At daybreak we sent two men back to look for him. Some of the other porters were snow-blind, one slightly frost-bitten. If we had delayed our retreat much longer we should have had to use half our men to help the other half down. Now everybody had to be got down as quickly as possible. We left the camp well on in the day, followed shortly by all the coolies. Jamna Prasad waited for the lost porter and those who had gone in search of him. It went on snowing—without stopping a minute all day. The glacier seemed dead: not a sound of falling stone or running water broke the silence. All the sharp outlines and corners were rounded off by the snow. We could move without too great difficulty, despite the snowdrifts in the lower-lying parts of the moraine—and we reached the site of our first camp in about 6 hours.

Next day, to our great relief, Jamna Prasad arrived with the three porters, the lost one having been miraculously found alive after a night passed under the deep snow on the glacier. He was in fair condition too. For the first time in so many days it had ceased to snow, and toward evening the sky was clear. That day and the next we were able to send for the loads left behind at the third camp. And we sent to Depsang the men who were now unable to work; they were to proceed thence to their own homes.

The morning of August 8th, having rested from the trials we had undergone, we set off to accomplish the last part of our task, the exploration of the southern branch of the Rimu. The weather was fine again, warm and still. Twenty-four hours of sun had cleared the mountain-sides of much of the snow that had fallen in the previous days. In 20 minutes we reached the foot of the spur terminating the dividing range between the two glaciers. Its sides were sprinkled with patches of green, starred with tiny pale blue and yellow flowers and some dwarf edelweiss; they seemed like jewels of great price in the midst of this desert of ice; we took care not to trample them, we hardly ventured even to pluck them. We rounded the promontory and began to ascend the short valley of the southern branch. A large high moraine ran along the left margin of the glacier, at a distance from the side of the valley, leaving a trough, with a flat bottom, where a stream was flowing. There was also a deep furrow between the bare glacier and the moraine, upon which typical high cones rose from time to time—here too under conditions which excluded ice pressure. We passed the openings of several gullies and gorges, all empty and glacierless. But the other side of the valley was entirely glacier-covered and large tributaries descended from it to join this arm of the Rimu. We went about half-way up the valley and camped at 17,140 feet, at the mouth of the last empty tributary valley, which once, when the glacier was much higher and closed up its mouth, had been occupied by a lake, as the little superposed terraces proved. A little above us came down the first tributary glacier on this side of the valley.

The lower portion of the southern branch of the Rimu, like that of the main branch, is all covered with blocks and needles of ice, of every shape and size. Like the main one too, it became less convulsed higher up. At the height of the camp it seemed like one

great boiling mass; a little farther up it grew flat and even, without visible cracks and mounted gradually to the upper basin, a large amphitheatre encircled by majestic peaks with great tributaries coming down from them. After a short rest Alessio, Abetti and Antilli climbed a near-by ridge to make a station. They found up there, as they had on all the jutting heights they had climbed, a little heap of small bones and feathers, the remains of hawks' meals. The little valley behind the camp was sprinkled with tufts of grass and flowers and we saw signs of antelope and gazelle.

We went to bed with our minds full of rosy hopes for the morrow. But we had

Southern branch of the Rimu, left-hand side.

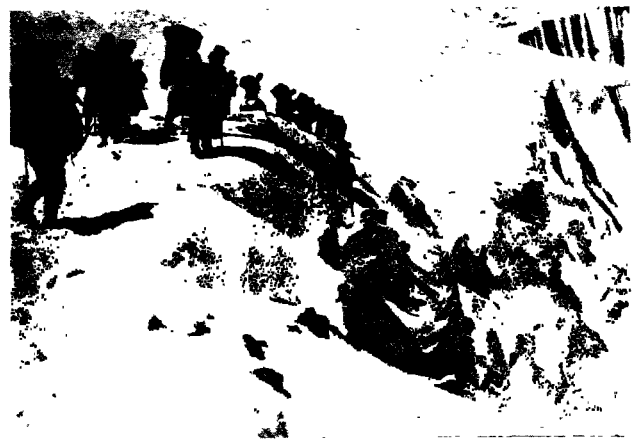
a cruel awakening, on a misty morning, with heavy storm-clouds over the valley below and on the mountains at the top of the glacier. Fine hail was falling, dry as sand. But Jamna Prasad set out soon after 6 to reach the upper basin. He was gone nearly 13 hours, and made several stations about the upper basin; with wonderful patience, taking advantage of every clearing of the mists, he succeeded in finishing the map in all its details. The peaks and the upper ridge had already been surveyed and drawn from the various stations made round about the front of the Rimu.

The good success of our work was undoubtedly due in large part to the admirable faithfulness and devotion of Jamna Prasad. He was a Hindu of the Brahmin caste, like his colleague Shib Lal, who shared the labours of Wood and Spranger with equal devotion. Belonging by race and habits to a tropical climate, he displayed extraordinary

power of resistance, both physical and moral, without weakening an instant at his task, insensible to cold, height and the fatigues of long marches in the deep snow, though his entire abstinence from meat reduced his diet—under the circumstances—to a handful of rice or lentils and the unleavened flour cakes (*chupatti*) which take the place of bread.

August 10th was the last day we spent on the glacier; we returned the same way we had taken coming up from our camp at the foot of the Rimu. It did not snow, but the weather was bad up above. All the upper glacier was shrouded in mist and clouds, and the sky was stormy over the Depsang.

Three days later we reached the base camp on the Depsang and were reunited to our companions. Alessandri and Ginori were just concluding their series of painstaking observations, after two and a half months of uninterrupted work. Dainelli and Marinelli had arrived on August 4th, Wood and Spranger on the 12th. In the following chapters they will describe their experiences in the period during which the expedition was divided into four separate groups.

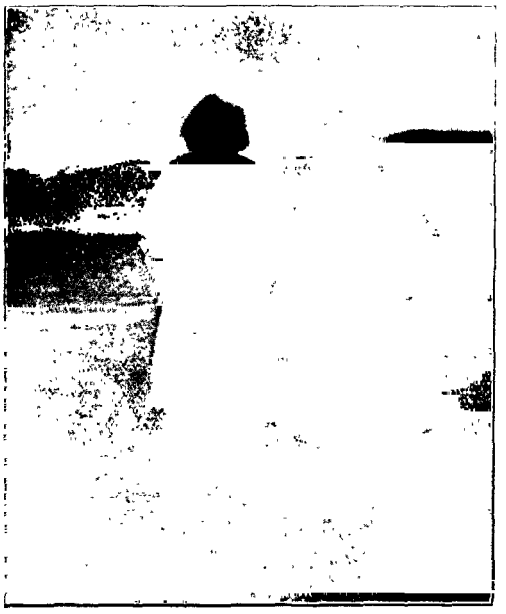


CHAPTER XII

LINGZI-THANG, THE SHAYOK GLACIERS, RIMU GLACIER AND THE SOURCE OF THE YARKAND RIVER

By Giotto Dainelli

From Leh to the Depsang, geological and morphological observations—Organization of the caravan —The uncertainties and disappointments of the Lingzi-Thang route—Rocks, fossils, flowers—On the great Tibetan plateaux—The glaciers barring the upper Shayok—The Rimu glacier.



Phot. Dainelli.

Changpas.

THE fortnight and more (May 16th to June 2nd) which we took to get from Leh to the Depsang plateau was the only period during which all the eleven European members of the expedition travelled together.

I had crossed the Chang-la on my last excursion, so the first stages were a holiday for me. However, before reaching the pass, we camped at Zingrul, where the fine moraine system of the glacial period, which had then been covered with snow,[1] was now bare, so that we could survey it—which we did, in the teeth of a high wind.

We crossed the pass into the Tankse basin but instead of going up it to Tankse as before, we continued the descent to its opening in the Shayok valley. I was thus able to supplement my observations on moraine deposits and lacustrine clays. We pitched the camp near the village of Shayok, inhabited by Changpas and the last human settlement we were to see on this side the Karakoram. We made sketches of some of the houses, but found them lacking in salient characteristics, like the Changpa houses

[1] See p. 269.

in older settlements previously seen. We profited by a two-days' halt at Shayok to make some short tours in the big valley, for the purpose of geological and morphological observations.

But, from the time of our departure from the last village, all anthropogeographical research perforce ceased, nor did I have a further opportunity of adding to my series of anthropological measurements; while the inquiry into place-names was reduced to finding out the precise names of the camping-places, they being the only topographical features after Shayok that possess native names. The researches of Marinelli and myself were thus limited to, and concentrated on, geology and morphology.

Phot. Dainelli.

Changpa houses, Shayok village.

The ascent of the upper Shayok valley, from Shayok village to the sources, gave us a chance of crossing the whole series of lithological formations between Ladak and the crest of the Karakoram; and of making the survey of a continuous geological section across a large part of this gigantic system of mountain-ranges, which none of my previous excursions had permitted me to do, and which ought to clear up the history of the foldings and liftings of the earth's crust that resulted in the formation of this, the greatest of all the plications of the surface of the earth.

In Baltistan and Ladak (with the sole exception of the narrow strip along the valley of the Indus and of my find near Shushal) the formations are almost entirely crystalline,

whether of eruptive or sedimentary origin, and very ancient; but on ascending the Shayok we passed from these crystalline formations to others more and more clearly stratified, less altered and less ancient. We were thus able to recognize and establish almost the whole series of sedimentary deposits formed throughout the course of geological periods. And also we were lucky enough to find numerous fossiliferous layers.

At Murgo—a well-known camping-ground at the junction of two caravan routes, the Sassir-la and the Shayok routes—we came upon the first fossils, of the carboniferous age. But on leaving Murgo to ascend the Burtze valley to its beginning in the Depsang plateau, we found ourselves among mountains of new and unusual aspect for this region: mountains of limestone and dolomites, whitish or grey masses with red cracks like wounds. They look rather like our own Dolomites; and like them represent geological epochs of the beginning of the Secondary Period, with the fossils proper to them. And in several places between the Burtze camp and Kisil Lungur, right under the edge of the Depsang, we found fossils of layers a little more recent. We spent a whole day in going step by step over that part of the way, and returned to it the next; so interesting were the frequent finds of animal vestiges from the ancient seas into which these deposits had settled.

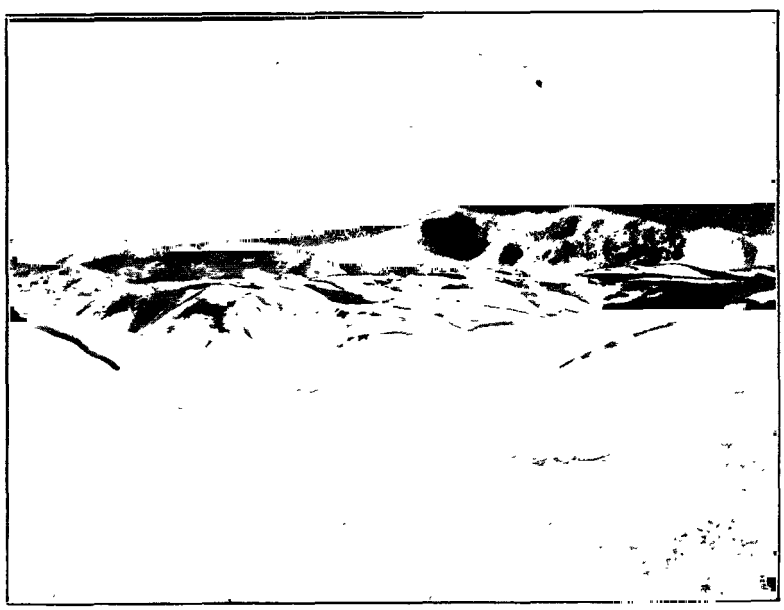
But it was not only stratigraphical and chronological geology that concerned us; not only the problem of how these mountains originated; but also the study of the forces which had afterwards moulded this region of the earth—in other words, with morphology proper. And in this field the Shayok valley proved most instructive.

Here too, as in the whole of this region, the essential features seem to have been moulded by the glaciers of the glacial period. Here more than elsewhere is displayed a feature, examples of which in our own mountains seem microscopic in comparison; and of which I had found striking examples in those parts of the Himalayas where I had been. I mean the isolated rocks, with more or less rounded surfaces, that stand up from the valley bottoms; the products of uneven erosion by the giant glaciers of the past. I had observed these rocks in the Indus valley, from the Skardu basin to Kakium, in the lower and middle Shayok, and in the Dras basin. But here in the upper Shayok they are of mammoth size, especially below Kataklik, where they divide the valley completely in two, making two parallel basins, of which one is deeper because of the river flowing through it, while the other is dry and lifeless. Many other characteristic features are linked with these, all equally interesting. There are also the large moraine deposits at the mouths of the lateral valleys, accumulated in a more recent period, when the force of the ice-floe from the side valley had already moderated and the ice was retreating towards the upper basins. Then there are immense alluvial fans of a date still more recent, and later eroded by the swift waters of the river.

From Kisil Lungur a short stage led up to the Depsang. What a marvellous sight! We stood about 17,500 feet above the sea, on a level plain of sand and small pebbles. A few crests of bare rock rose up eastwards, in the direction of the great

Tibetan plateaux. Towards the west we saw great snowy peaks, the beginning of the Karakoram range. We were on the border between two different worlds.

The expedition's base camp was set up on the Depsang. But we two, geologists and geographers, had no scientific programme to detain us on that extreme outpost of the Tibetan plateaux. A few short excursions taught us all we needed of its formation and characteristics. Across the Depsang passes the caravan route that connects India with Turkestan; but on either side that slender track—trodden by caravans and marked by the skeletons of animals—lies unknown country. To the west are the great glaciers where the Shayok rises, to the east the immense plateaux of Tibet.



[*Phot. Dainelli.*

Small valley going up from Kisil Lungur to the Depsang.

Of the glaciers only the terminal portions were known, of the plateaux there was some vague information gathered by the few travellers from the Kara-Kash to the Chang Chenmo.

Under the circumstances we stayed on the Depsang only for the few days (June 3rd to 10th) needed to organize our first excursion on the plateaux. My experience of travel in barren regions had taught me to simplify my wants, and to economize wherever possible, especially in time. The cases were so packed that each contained all that the party needed for a certain number of days, and could be deposited by the way; we had thus to handle only one at a time. All this took some days. But there was a much greater difficulty. We had planned to reach on our eastward journey a place

named Taldat in the northern Lingzi-Thang, touched at by some earlier travellers. We reckoned that, with good going, we should need a month to get there and return to the base.

But in a region where every requisite must be borne on men's shoulders, one's sphere of action becomes limited, especially when the number of loads containing provisions is greatly reduced in comparison to the whole. These " unproductive " burdens considerably reduced our mobility, to a figure of 15 days with a caravan of 15 men. Each man we might have added would not have further increased our mobility, as we should have had to carry food for him.

I solved this problem by obtaining from Dr. De Filippi a temporary loan of another 15 men, who were to return to the camp in a week by forced marches without loads. At every stage I left the provisions which these men would need on their return trip. I also decided that I would make a deposit of necessaries for our return journey at some place which should serve as a base for the 15 days' excursion permitted by our small caravan.

Despite unexpected obstacles, this excursion was in the end more rapid than we had foreseen (June 11th to July 6th). The greatest difficulties arose from our having a little too much confidence in the maps of our predecessors. I have already referred to earlier crossings of the Lingzi-Thang, made at right angles to the route we were to follow; and the maps, based as they were upon the results of those early explorations, proved very deceptive. The only reliable geographical feature was the upper course of the Kara-Kash, which flows northward. I will mention some of the difficulties we encountered on the way.

Our route—from what we knew of the approximate position of Taldat—was to be from west to east, at least in a general sense, apart from the deviations we might have to make because of the nature of the country. The Depsang plateau is bounded on the north by the trough of the Chipchap, which comes into the Shayok from the east, a little below the source of the latter from the front of the great Rimu glacier. We had no doubt that we should be going in precisely the right direction if we followed the Chipchap up-stream. And we set out with our two caravans, permanent and supplementary.

We had not a man to spare: no " caravan bashi," no servant, no cook. We ourselves helped to pitch and strike the camps. Marinelli, the early riser, made breakfast, I was responsible for the two principal meals. They were not banquets, but we did not starve. By common consent I undertook the direction of the caravan; partly because of the greater experience gained in many months of continual excursions; partly because I had picked up a few dozen words of Hindustani; and finally on account of my knowledge of the Ladakis, in particular of the men in our permanent caravan. These were all from Temesgam; some of them I had known since I stopped in their village between Kalatse and Leh, but all of them knew me; I had a reputation for my

quickness of movement under adverse circumstances, and for the interest I showed in their lives.

They were incomparable servants. Treated firmly but kindly, rewarded when a reward was deserved, they always proved willing and ready for extra work. They were cheerful, serene and smiling, even when panting with their loads up steep ascents of rock, detritus, or snow. At the end of the summer, these men who had been with us all through showed plainly that their sorrow at leaving us was greater than their joy at returning to their distant homes. Two in particular were attached to me: Namgyal and Sonam Konchok. I set down their names because each was in his way the

Phot. Dainelli.

My caravan men, from Temesgam.

epitome of the virtues and merits of his race and his fellows. When all the other Ladakis had gone home and we turned our faces toward Turkestan, Sonam Konchok went with us as personal servant as far as Kashgar; and when we finally parted he did not conceal an emotion as simple as it was sincere. With people like the Ladakis one can accomplish a great deal.

We made two camps in the Chipchap valley. It is a wide alluvial valley with a gentle slope, enclosed among rocky crests of moderate size, with occasional small glaciers. If one forgot the actual height above sea-level, it looked like a landscape of rather rugged hills. But we were actually between 16,000 and 17,000 feet high. The truth is that these valleys are only wide troughs cut out in the plateau, the original uni-

formity of which has only begun to be carved into. These are strange valleys, indeed. After our second camp by the Chipchap—whose waters hardly ever come to the surface, but flow under the wide alluviums of the valley bottom—we continued our way eastward following the same trough.[1] But at a certain point we saw water bubbling up among the pebbles, flowing in the direction in which we were going. In other words, we had crossed the watershed ; we had passed unawares from one hydrographical basin into another. And this is, indeed, characteristic of the chief valleys of these Tibetan plateaux that they do not have their origin in a mountain crest, a saddle or a rocky pass, but in an alluvial plain. To such an extent that at times, unless we noticed the course of the current as it bubbled up, we did not know in which direction the slope lay. How many times afterwards did we stop and discuss whether we had, or had not, crossed a watershed !

However, having issued from the basins of the Chipchap and Shayok, we ought to be in the basin of the Kara-Kash. The great trough continued eastwards, and it would not do for us to abandon it. So we went on—in bad weather—until it widened out, and we decided to pitch our camp in a sheltered spot on its edge. What was our surprise to find clear signs that a tent had been pitched before in that very spot ! We showed our respect by setting ours up a little farther on. Beyond a doubt Sven Hedin had made camp here before us ; and we christened our own with the name of the explorer.

Sven Hedin could not have come here by way of the Chipchap ; his must have been a more northerly route. Nor could he have taken our road along the valley. He must have climbed over its left-hand side, reaching the Kara-Kash much lower down than we did.

We went on our way, and in two stages reached the Kara-Kash, probably at that stretch of it which is called Dong Lung on the maps. Here we made a cache of supplies against our return, and also left our heavy lithological collections.

At Dong Lung our first doubts arose : the natural way eastward being cut off by the Kara-Kash valley, ought we to descend this to the north, or go up it to the south ? We decided on the second course, hoping soon to find a pass on its eastern side.

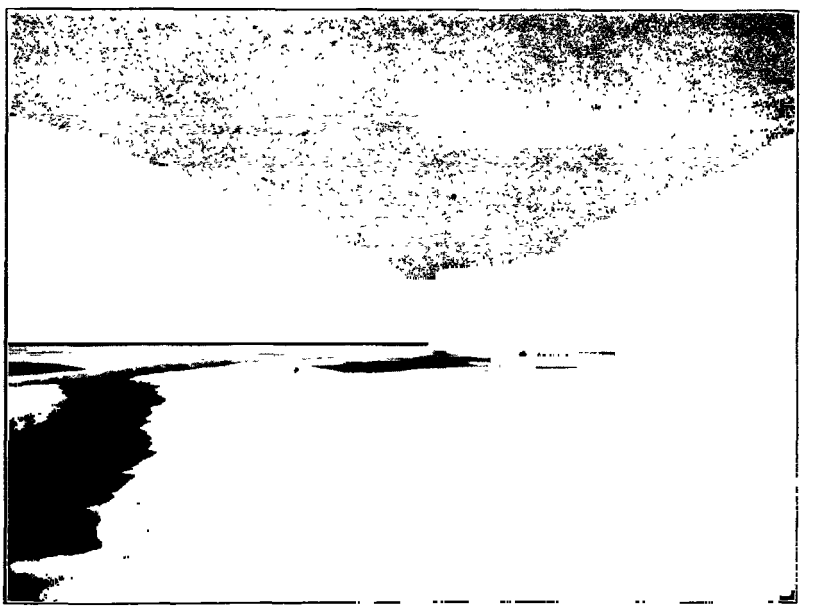
The bottom of the Kara-Kash valley was one great slab of ice, whose whiteness contrasted strongly with the black rocky sides. Only occasionally was the great slab broken, and the river flowed calmly and quietly beneath. We made our new camp on the edge of a slope of detritus that seemed to offer a way to our goal. Around us was a fantastic landscape of limestone spires, piercing the smooth surfaces of the ancient schists.

From this camp our troubles began. We had thought that the pass we should

[1] Mr. and Mrs. Visser, on their expedition in 1929, found that the main branch of the Chipchap is not the eastern one but a larger branch issuing from a mountain group on the north (*op. cit.*, p. 21). (F.D.F.)

ascend would lead us to the boundless plains of the Lingzi-Thang. But when we reached the top, we saw instead another valley running down southwards to the Kara-Kash. We climbed it to its head in a high rocky pass, whence another valley opened out, filled with a glacier in its upper portion, and descending to the north, likewise to the Kara-Kash. The day was extremely tiring and its results disheartening. We set up our tents in a small space we found free from snow; it was hard to find fuel.

The auxiliary caravan ought to have turned back; but so far as we could judge, it could get down the valley and reach Dong Lung in one stage, and we knew that our



Phot. Dainelli.

The frozen Kara-Kash.

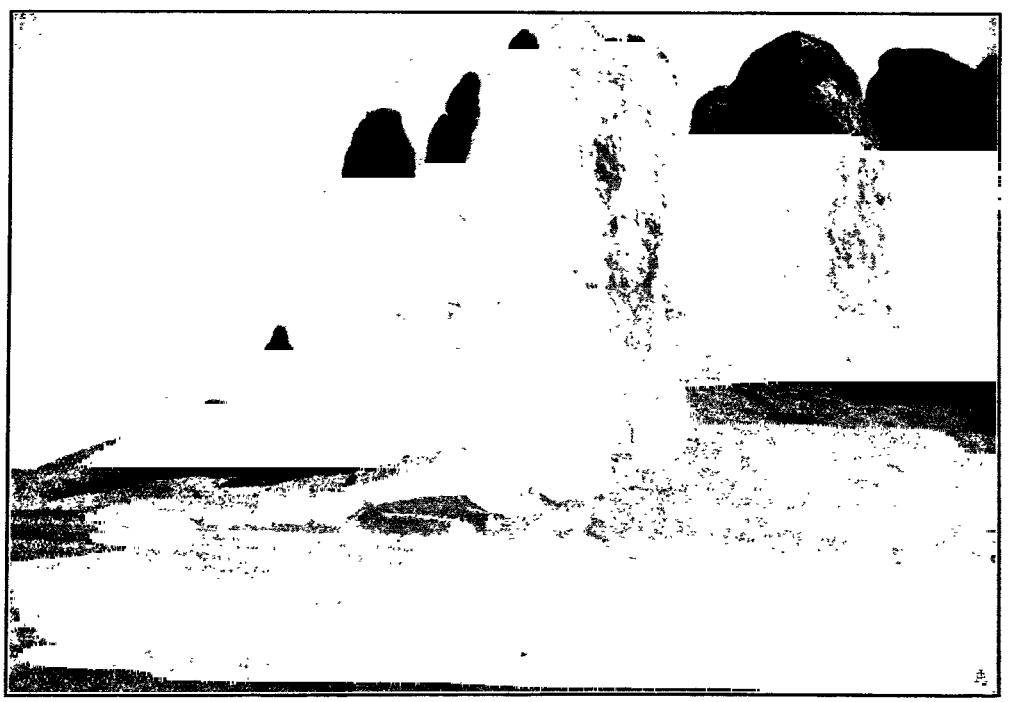
next day would be still harder, so we decided to keep it with us for another day, in order to relieve the men from Temesgam.

Never in my life have I felt so tired as I did that day. From the top of the glacier near our tents, we had seen a high, snow-covered col. Surely the Lingzi-Thang must be beyond! We climbed up. The ascent, steeper than we had thought, in soft snow up to our knees, under a hot sun, used up all our strength, and the men's as well. When we reached the top, above 20,000 feet, we threw ourselves on the ground completely exhausted.

But it was not the immense level plain of the Lingzi-Thang that we beheld from the col; rather we saw what seemed a boundless sea of crests with a labyrinth of valleys deep among them. Our goal was evidently still far away. A glacier led down from

the col into a wide valley stretching north; but I could not tell if this would lead us to Taldat.

However, we had to follow it. But as ill luck would have it, we found, after three stages, that the valley led us back to the Kara-Kash. This river became our nightmare. However much we tried to get away, fate always led us back to its great sheet of ice. But opposite the third camp we made in what we called " the unknown valley "



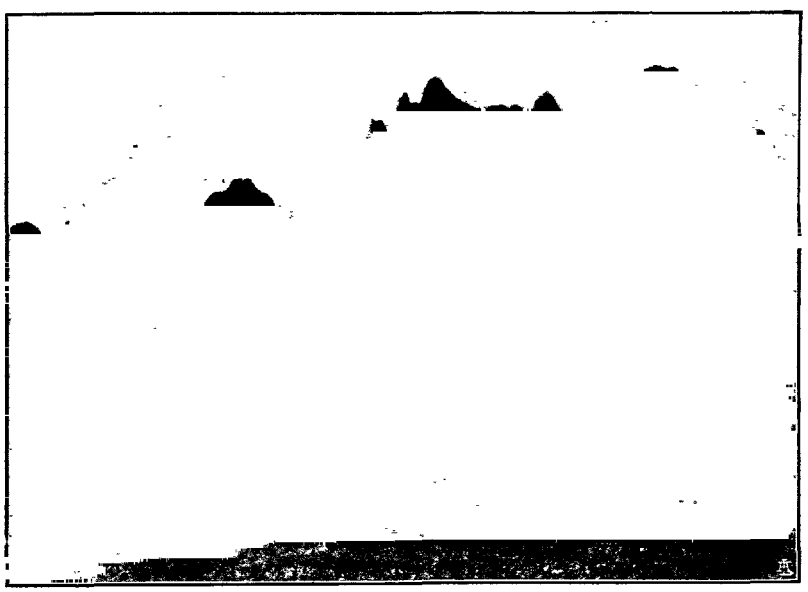
Phot. Dainelli.

Fantastic shapes in the upper basin of the Kara-Kash.

there came at last a widening in the mountains to the east, ending in a broad, low pass. Surely there lay our way. And we gained the pass.

It must not be supposed that our long weary stages were nothing but a forced march. We had also to survey our route, and much of this work fell on Marinelli, when I was busy with the caravan. Such work is a considerable mental strain, added to the physical fatigue due to the high altitude. Another practical difficulty was planning the stages and deciding where to pitch camp. This may seem an easy matter, as the whole place was ours to choose from, but there were many considerations: it must be in a spot sheltered from the wind, so that we could rest and work. Then we must have water and fuel. These wide high valleys are nearly always dry; we had to watch

closely for signs of moisture. For fuel we had relied on the *burtze*, which we found in the Chipchap valley, but hardly ever farther on. So we had to find a place near which the dried dung of the wild yak was to be had. Another difficulty was the bad weather. Besides the wind, which often rose to a gale, there were frequent violent hail and thunderstorms. But despite these drawbacks we found infinite enjoyment, partly in our life of complete liberty, partly because of the excitement of each day's march into the unknown; and above all because of the scientific results we were reaping. These, to



[*Phot. Dainelli.*

Limestone spires among the schists of the upper Kara-Kash.

our eager eyes, seemed, and actually proved to be, of great interest for the geological knowledge of the region.

They were interesting for the study of the morphology of the plateau; for the establishment of the very high level of the present snowline, and for the almost absolute lack of any sign of considerable glacier expansion during the glacial period. The remains of ancient extensive lakes were of interest, too, remains that in the level tracts of the Lingzi-Thang appear either as large deposits and terraces, or as residual small lakes. But all this refers to recent geological history. For the more ancient, we collected an abundance of interesting material, by observations and records, which would allow us to reconstruct, more fully than had been possible hitherto, the conditions of the seas in which these soils were deposited, and their age, and the age, too, in which they were folded and lifted in this great upheaval of the earth; also the irregularity with which these powerful movements of the earth's crust were consummated.

The records I mean were fossils. After leaving the wide low pass which I have just mentioned we found them constantly. So great was their abundance and variety in one particular spot that we named it Fossil Camp. There were fossils dating from epochs older than the Carboniferous, down to the most recent Secondary.[1] We had hardly enough cases to contain all our precious finds. But the hunt did not hinder our marches to the detriment of our general exploration, or delay our return to the base camp. We collected as best we could, aided by the most intelligent among our men, and then set off again. In addition to rocks and fossils we collected the flora. Even before my departure from Europe I had decided to limit our botanical collection to the zone above 16,000 feet. In the inhabited zone my programme of researches was already heavy enough to occupy all my time ; and the flora of the lower districts had often been collected before, besides which I should not have found the plants in bloom owing to the lateness of the season. During the whole excursion on the plateau and later in the stages above the agreed limit we continued to gather and press the plants.

We believe our collection to be fairly complete ; there are only about 90 species, but their scented brightly coloured blooms gave an unusual note of delicate grace to the desolate barrenness of the rocky landscape. It is an interesting fact that almost all are identical with Alpine species.[2]

We crossed the wide low pass, and found ourselves in another of the usual large valleys, filled with alluvium and enclosed by rocky crests of moderate height. It began to descend in a southerly direction, then it turned north-west. Could it be that it too led to the Kara-Kash ? We felt we must leave it, and did so by one of its tributaries, that came in on the east. After a few miles, this valley revealed a big saddle on its right side. We set up our tents, and went to reconnoitre : another valley descended thence to the north-east, but at the end of it the horizon opened out in an immense plain, lying dim and uniform in the evening mists. There at last was the Lingzi-Thang ; or rather its northern portion, sometimes known as the Aksai-Chin : it was, in fact, our goal. The next day we reached it, skirting the southern edge of the great plain until we reached a spring which marks the locality of Taldat.

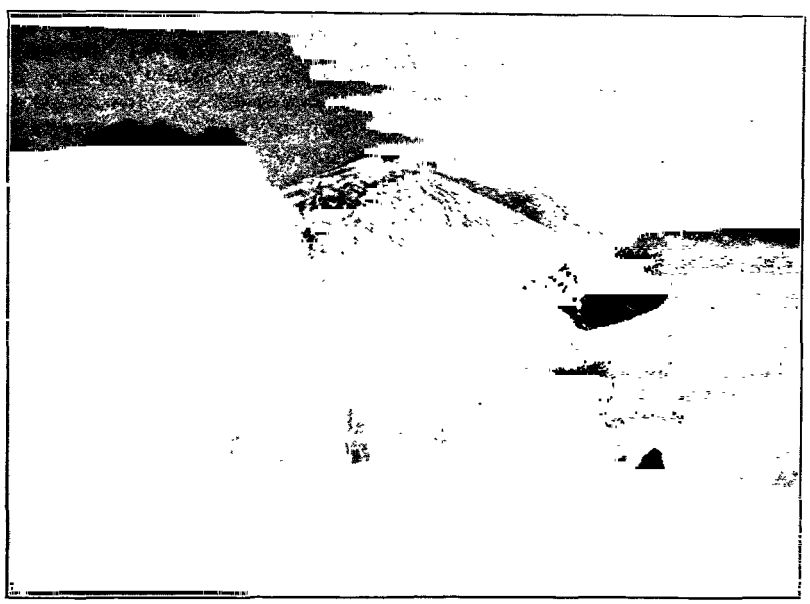
It was not easy walking in the fine, almost impalpable sand of the plain, we sank into it in a maddening way ; not only getting to Taldat but especially on the following day, which we spent in making at least a partial examination of the central zone of the great uniform plain. The waters of the stream flowed in a bed sunk in the clay, formed a lake and then passed on into another one, beyond which we could not follow them ; but we observed a marshy area where they evidently stopped, taken up by the intense evaporation and lacking a further means of egress.

[1] The fossils are described in Vols. v and vi of the *Relazioni Scientifiche*, by E. Fossa Mancini, C. F. Parona, G. Stefanini and M. Gortani.

[2] The flora collected is described by R. Pampanini in Vol. x, Serie ii, of the *Relazioni Scientifiche* ; the fauna by D. Vinciguerra.

One's mind went back to the time when all this vast plain was one great lake, as is shown by the vast clay deposits in the whole of its central portion, the detritus of gradually increasing size in the marginal zone, the terraces, and even the traces of erosion that we saw locally in the rocky border of the great flat basin.

In our Taldat camp we had an extraordinary sense of immense solitude, buffeted by the violence of the wind, for we had not sought a sheltered spot, being obliged to set up our tents near the spring, the first I had seen since Puga, also the last I was to see. And what a spring it was; abundant, icy, gurgling away in manifold streams



[*Phot. Dainelli.*

Our highest camp, between the Kara-Kash valley and the Lingzi-Thang plateau.

to its distant destiny; edged by a great crust of ice, chiefly caused by the low night temperature.

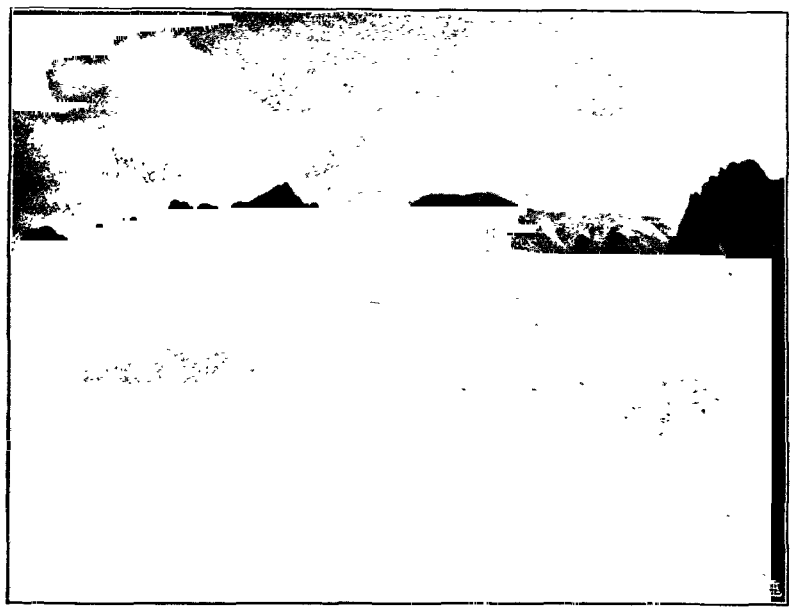
Summer was now at its height, and in the early hours of the afternoon the temperature rose—sometimes up to 59° or 60° F.; but at night it went down as low as 5°. I had never felt the cold as I did now; owing to fatigue, and even more to the continual tormenting wind and squalls. A big fur coat from Yarkand was not enough to keep me warm; whereas in the height of winter, in the Braldoh, Basha, Kondus and Saltoro valleys, I had dressed as I would at home in the spring.

We would gladly have lingered at Taldat, but time pressed. We had already wasted precious time—searching our way between the upper Kara-Kash and the great plains. Then we had to pick up one of our men who had fallen ill and been left

with a companion and a limited supply of provisions at the camp near the wide low pass.

But we did not go back as we had come. From Taldat we turned south, passing from the Aksai-Chin to the true Lingzi-Thang, and thence westward. We had some trouble getting back to the old camp, but reached it to find the invalid already recovered. The illness had been due, I think, to over-indulgence in Tibetan gazelle.

We took another route back to the Depsang—partly to cover new ground, partly to avoid the trying climbs on snow and ice-slopes. We reached the Kara-Kash much



[*Phot. Dainelli.*

Resting in a valley among the plateaux of Tibet.

below Dong Lung, and ascended the valley, not without some difficulty at the continual fords. Even in this short time the crust of ice was gone, and the river flowed in a deep and muddy stream.

At Dong Lung we felt as though we were on a main route. In six stages—not always easy ones—we were back again at the base camp on the Depsang.

The camp was almost abandoned. There were only our two meteorologists, Alessandri and Ginori. Wood and Spranger were continuing the trigonometrical survey carried out from Leh, the others were making a survey of the Rimu. And we too were bound for this great and till then unknown glacier, from whose vast snout, bristling with séracs, the Shayok issues. Also we wanted to visit the fronts of other glaciers that run out across the Shayok valley lower down, sometimes so far as to dam

up the waters of the great river. Certain it is that the Karakoram route has not always crossed the Depsang, but at times has led up the Shayok valley to within sight of the Rimu, where it entered the trough of the Chipchap. The alternate advance and retreat of the lateral glaciers has caused the two routes to be used in turn.

With this new programme in view we spent only four days at the base camp (July 6th to 10th) the time required to put in order our few possessions and reorganize the caravan. We kept the same men, and needed only to prepare the necessary supplies. It had been arranged that provisions should be deposited for us in a base camp near

Phot. Dainelli.

Coolies' tents, Taldat plain.

the front of the Rimu, sufficient to last for two weeks, the time estimated for exploring the glacier and returning to the Depsang. I confess that I did not feel happy not to be self-contained: in regions like these a margin must be left for the unforeseen. So I loaded the caravan to its full capacity and simplified our provisions still more than heretofore, in order to be able to carry supplies for a twenty days' excursion. As it turned out, the provisions at the Rimu base camp went to supply the much greater needs of the main body of the expedition. So all was well; save that we heedlessly went too far and so had to ration still more strictly our already limited provisions.

Our campaign on the glaciers called for some addition to our equipment: we needed ropes, crampons, ice-axes and snow-spectacles. After all these months of continuous work, I was very tired. But the prospect of exploring some of the largest

continental glaciers of the world was enough to kindle my enthusiasm; to which was added the passion of the old Alpine climber. Save our 15 porters we took no one with us; and in addition to doing the survey work I should have to act as guide, in the Alpine sense of the word. So we set forth.

The excursion lasted longer than we thought (July 11th to August 4th); developing in a way quite unforeseen. From the Depsang we went to the confluence of the Chipchap and Shayok. The next thing was to cross to the right bank of the Shayok, an anxious prospect, but after several attempts we succeeded in crossing with all our belongings. But we could expect no more from the men that day, and we camped on the river-bank. Fortunately the *burtze* was abundant, and a big fire took away the stiffness of our weary muscles. The sky was cloudy, and a storm threatened.

We were, of course, surveying our route as we went; also we were collecting plants and minerals, and looking for fossils, of which we found a good many in the first marches. And we continued our observations on the glacial period.

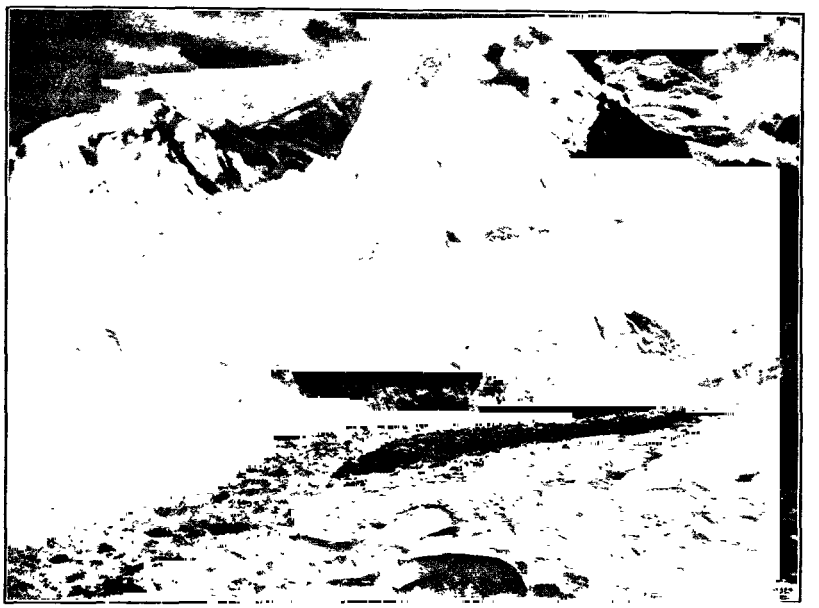
We began to go down the right bank of the Shayok, the side on which the glaciers descend to bar the old caravan route.

We had with us an account of the route we were taking, from the pen of a famous English traveller and mountaineer, Dr. T. G. Longstaff; and it was not a narrative to make us take lightly the task before us. Alpine-climbing with a laden caravan is not the same as Alpine-climbing free from impedimenta in our mountains at home. However, I must say that we took less time than our English colleague to reach the face of the great Kumdan glacier; despite our preoccupation with the survey and the other observations. On the return journey, going in the same direction, we took exactly half of his time-record, even though we were following a new route. But for all this, I cannot say that going along the right side of this tract of the Shayok valley is the simplest thing in the world. We too found places that Alpine guides would certainly have called *mauvais pas*. But they were safely surmounted.

We planted our little Whymper close by the snout of the Great Kumdan, which is marvellous. The glacier penetrates into the Shayok valley, pushing the river itself over to the opposite side. Here we spent the whole afternoon in examining the glacier. Not only is it vast, compared to European ones, but it has very different characteristics as well. It is composed of alternating longitudinal stripes of moraine and live ice, the first blackish, the second white. The stripes of moraine are long elevated ridges; while the stripes of bare ice are great rows of gigantic pyramids all the way from the distant source basin of the glacier down to its snout. Near the snout they give way to irregular lumps of moraine, holding stagnant pools and little blue lakes in the hollows. We made a more detailed survey of the snout of this and the succeeding glaciers with the intervening tracts of valley. For, as I say, the Great Kumdan is not the only one to present these special features in its snout. A few miles farther on, another, the Little Kumdan, penetrates into the Shayok valley, also from the right. It is even more beautiful;

opening out like a fan into the valley with its great stream of ice not defiled by moraine, but all one dazzling whiteness. It, too, is a labyrinth of pyramids; we crossed it, in order to camp beyond, but the crossing was not easy: not only had we to cut steps, but also, in that labyrinth of pinnacles we could see nothing of our surroundings and had at times to use the compass; obliged as we were to keep as direct a line as possible, for the survey.

We kept on down the valley to another glacier, the Great Ak-Tash. It was like the Little Kumdan in its widespread fan, and in the whiteness of its tumbled masses.



[*Phot. Dainelli.*

Front of the Great Kumdan, shutting off the course of the Shayok.

But the snout thrusts itself so far across the Shayok valley that it reaches the rocks on the other side and forces the river to tunnel under the ice. Only a little more and the Shayok would be barred. And in fact, if the barricade produced by the Great Kumdan is largely traditional, there is actual evidence of those caused by the other two glaciers, in the terraced deposits that fill the valley bottom above each of them. There is certainly a connection between these barricades—and the consequent damming up of the water, which afterwards breaks down the ice barrier and rushes down the rocky valley—and the catastrophic floods that some decades ago devastated the oases of the middle and lower Shayok, of which we have received accounts from earlier travellers.[1]

Still farther down is a fourth glacier, the Little Ak-Tash, but it stops half-way down

[1] See p. 322 and notes.

the slope, hanging above its masses of moraine. Below its snout the whole Shayok valley opens out, as far as the ford of Sassir. We broke off there, to begin the return, almost as we had come, to the old camp on the bank of the Shayok opposite the mouth of the Chipchap. Thence we proceeded to the great front of the Rimu, where we stopped; continuing our survey and our usual collections and finding any quantity of new fossils.

And now it was our turn to climb the Rimu, the great plateau of glacier that sends down three huge streams towards its terminal snout. We attacked it near its centre

[*Phot. Dainelli.*

Peaks and pyramids, the result of erosion in the tongue of the Great Ak-Tash.

without difficulty. But hardly had we reached the surface when trouble began. The glacier was a wilderness of séracs and spires and pyramids, gigantic forms of melting, compared to which what we had seen on the Kumdan and Ak-Tash was scarcely worth mention. It was difficult, sometimes even dangerous, searching a way through that immense labyrinth. In our own Alps, the waters of surface melting can be crossed in a leap; there it took three hours of effort to cross a water-course, so wide and deep and turbulent was it. We got across only by means of a slender bridge of ice, to reach which we had to descend a very steep incline, threatened from above by continual falling stones, to a precipitous bottom above the abyss of the river that was there deeply imbedded in the mass of ice. But we crossed all the width of the front without incident. and reached the left side of the main branch of the glacier, where the moraines allowed

us to get on faster. Here we made two camps. In one of the two, however, we had to stop.

We expected to find provisions for our caravan, and in this hope, and to relieve the men, we had left part of ours at the foot of the glacier. But when we found no sign of supplies, we had to send back all the porters to bring up ours and also as much *burtze* as possible. We had to adopt this system of sending on the impedimenta in sections as far as our third camp on the Rimu, at the meeting of the two upper branches; where we found part of the main caravan. We were able to give them a little flour

Phot. Dainelli.

On the Rimu.

and a great deal of our *burtze*: large organizations may, sometimes, be helped out by smaller ones.

The weather was often bad, but from our third camp our march was quicker. We ascended the main branch of the glacier, pitching our tent a little beyond our companions' camp. It was not comfortable to camp in soft snow, into which we sank almost to the waist, while flakes fell thickly on us. The following day everything was wrapped in mist, and as we could not make observations, we went back to the third camp in two stages.

Our observations were chiefly concerned with the characteristics of the Rimu, which are common to all the great glaciers of the Karakoram, though perhaps no traveller has put them completely in evidence. It is essentially a question of the typical division

of the glacier into zones between the snout and the upper basin, each characterized by special forms of surface melting. Other special features are the marginal lakes, the phenomena of ice pressure, the form and distribution of the surface moraines. From our third camp we saw an opening in the rocky left flank of the glacier on the left. We thought it possible that a secondary snout might descend thence into a tributary valley of the Chipchap, and in this belief we concluded we should reach the Depsang in the same time whether we went down the main branch of the Rimu by the old way, or by this secondary snout. Of course, we took the new way.

[*Phot. Dainelli.*

Camp IV on the Rimu.

And so we descended the glacier into a valley which, quite unexpectedly, did not run south-east towards the Chipchap and our base camp on the Depsang, but northwards. We began to follow it, hoping it might bend. But after a few stages we were driven to conclude that the valley was definitely going north; that it belonged to the northern slope, not the southern, of the Karakoram, and that it must represent the origin of the Yarkand, which hitherto had been placed much farther east. Wood and Spranger, unknown to us, had come to this same conclusion two or three days earlier, coming up the valley, to the front of this branch of the Rimu. Another fact we had to admit was that the provisions that would have been sufficient for reaching the Depsang from the third camp on the glacier by the old way or one equivalent to it, were diminishing in an alarming manner, thanks to this interesting topographical discovery.

So we began an urgent search for a road south, carrying on our survey and collections and noting the morphological characteristics and the glaciers on our way. Also we found quantities of new fossil fauna. At last we discovered a way into a valley, which we easily recognized as the caravan route of the Karakoram. But we were more than two stages north of the pass; it was beginning to snow, and we were all very tired. Our rations were really most meagre, nor could we find consolation by conjuring up memories of past plenty. However, we crossed the Karakoram pass and got one stage nearer the Depsang. But now we were at the end of our provisions and almost at the end of our strength, though we still kept our good spirits. That day and night there was an extraordinary fall of snow, and in the morning when we looked out of the little Whymper, half-collapsed under its weight, we saw a thick mist that blotted out everything. Then, truly, it did not seem a very simple matter to reach the Depsang.

But all's well that ends well. We were overtaken by a large caravan of Yarkand merchants with dozens and dozens of horses, carrying felts and other goods to Leh. Two of the horses were without loads; and these two were for us.

It was not easy to find the way. There were halts, doubts and changes of direction. But at last we arrived. The great journey was practically over.

CHAPTER XIII

THE WATERSHED BETWEEN THE RIMU GLACIER AND THE KARAKORAM PASS—THE SOURCES OF THE YARKAND RIVER[1]

By J. A. Spranger

From the Depsang camp to the watershed—Unknown valleys west of the Karakoram pass—Hayward's lake —Probable origin of the Shaksgam valley—End of the northern branch of the Rimu glacier—Discovery of the source of the Yarkand river—Exploration of the Yarkand below Hayward's basin—Crossing the mountains east of the Yarkand—The Karakoram Pass from north to south—Exploration of the southern slopes of the Karakoram between the pass and the Rimu basin—Return to the Depsang camp—Second period of exploration—From the Karakoram to Kufelang—The exploration of the second and third western tributaries of the Yarkand valley —Traces of predecessors.

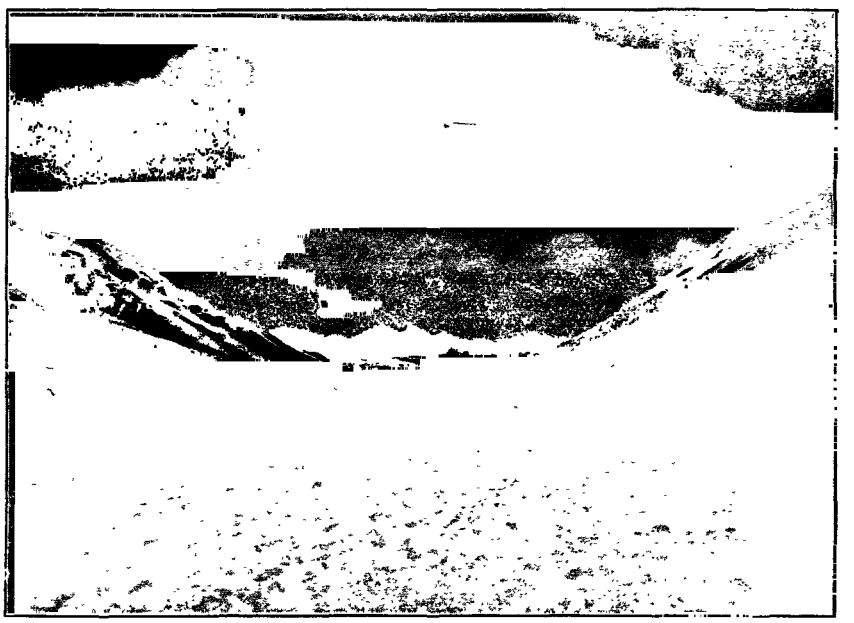
Phot. Spranger.
The Gurkhas (from Nepal).

ON July 2nd, the day after the departure of De Filippi and his party for the Rimu glacier, Wood and I left the base-camp on the Depsang plateau and turned northwards. We had set ourselves to explore that part of the watershed between India and Central Asia, which lies between the Rimu glacier in the west and the Karakoram pass on the east, with the valleys descending on either side to north and south.

Our caravan was made up of ourselves and the surveyor Shib Lal, the two Gurkha orderlies and 30 coolies. We followed the regular Karakoram caravan route for two short stages, crossing the Chip-chap valley to the north of the Depsang plateau and

[1] The subject-matter of this chapter has been dealt with more fully by Colonel Wood in his report, *Exploration in the Eastern Kara-Koram and Upper Yarkand Valley*, etc., published by the Trigonometrical Survey of India, Dehra Dun, 1922. See also Spranger's account in Vol. I, Series I, of the *Relazioni Scientifiche*.

ascending a wide valley beyond towards the crest of the range. The pass, however, is not situated at the head of this valley, but at a point in the watershed ridge on its left, reached by a path slanting up the side. Here we left the caravan road and continued up the broad main valley which inclines gently upward to its not very distant head. At the top there is a broad, shallow slope, which seemed to join the valley we had just left with the one going down to the north-west, which we were about to explore, rather than to separate one from the other. In a small hollow near by were the provisions that had been brought for us in the last few days from the Depsang. It began to snow



Phot. Spranger.

Pass and valley north-west of the Karakoram Pass, leading to the Yarkand valley.

and blow while we were setting up camp. In front of us a stream came down from the mountains; but instead of choosing one or other of the two valleys to flow in it separated into two branches and ran down either side of the divide. I shall have occasion to note various other similar cases of uncertain watershed in the region we were exploring.

From here onwards we were off the beaten track, having entered unexplored territory. It is true that T. G. Longstaff had noted the valley we were about to descend, and had surmised that it ought to lead to the upper Yarkand, north of the watershed. But neither he nor anybody else had ever entered it so far as we knew. Our impatience was put to a hard test by a raging snow-storm that for 36 hours kept us prisoners in our tents. At last, on the morning of July 6th, we were able to set out.

R. W. Spranger Pinx

From a Neg. of J. A. Spranger

Hayward Lake in the Upper Yarkand Valley

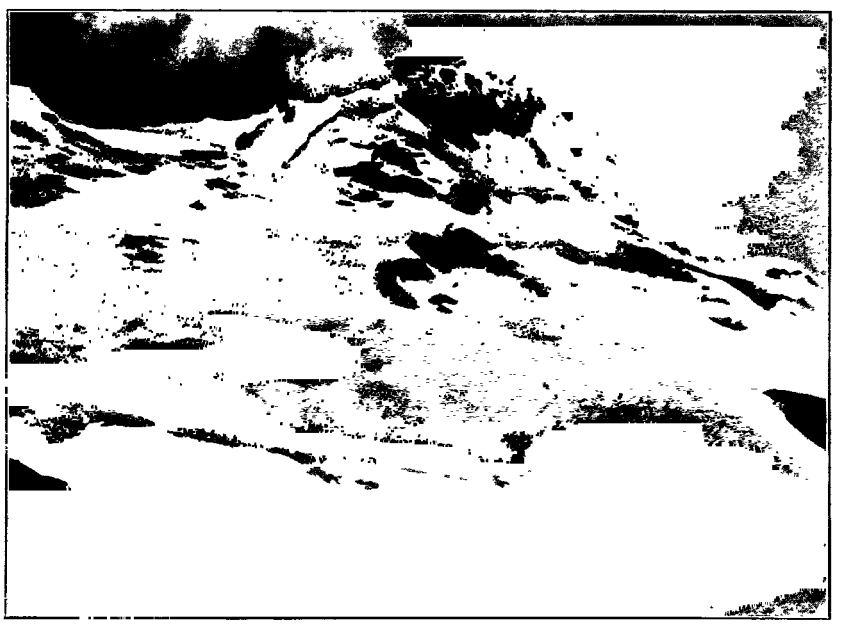
Only three weeks later could we be certain that the valley we had reached was none other than the upper course of the Yarkand river, and the basin just described the one reached by G. W. Hayward in December, 1868, when ascending the Yarkand valley. Being convinced that he had found the source of the river in this little lake, at that season frozen and snow-covered, he had not pushed on farther up the valley. However, we noticed at once that the lake had no superficial outlet and that it can be of only secondary importance as a feeder of the river which flows on the other side of the basin half a mile away.

We went down to the bank of the lake by earthy slopes covered with *burtze*, crossed the basin, and set up camp at the foot of the great limestone peak, where a stream coming in from the west mingled its waters with those of the river. The same day we pushed on about six miles down the valley to where it bends north-west. We saw how much the river rose in the afternoon, from the melting of the snow and glaciers that feed it; for on our return we found a swollen and turbid stream where three hours earlier there had been a dry beach. It was not easy to get across, despite the help the porters gave us.

During the next two days, July 8th and 9th, we made two stations: one at the end of a spur of the limestone mountain, one on a peak of the crest overlooking our camp. The summits of the Rimu and the Depsang made it easy for us to fix our position. But the absorbing thing for us was the view into the unknown valley that went up southward, above the basin of the little lake, among mountains that gradually became higher and higher as the eye followed it to its head. The valley appeared to be occupied by a great glacier; we took this to be the northern branch of the Rimu of which we had already caught sight from the high station made on June 14th near the great front of the glacier, whence the Shayok river issues. We made up our minds to ascend our valley to its head to ascertain before anything else what was the source of the river. Meanwhile we had sent on a good number of our coolies to take provisions from the cache by the Karakoram Pass. To these supplies we added two gazelles killed by our Gurkhas —a pleasing change in the tiresome diet of tinned food.

On July 11th, with provisions for five days, we started up the valley. To my surprise I found clumps of edelweiss in a secluded corner among the rocks. It was rather greenish and drooping, but served to remind me of our Alps. As we were crossing the plain beside the lake a solitary kyang or wild ass let us come to within a hundred yards of him, when at the sound of our voices he darted away like an arrow. We sent the porters and Gurkhas on their way up the valley, while Wood and I with the survey instruments began to ascend a little grassy valley and then slopes of detritus and a snowy incline to a peak of broken rock 19,055 feet above sea-level, where we made a successful station, the air being very clear. We could see and recognize not only the peaks of the Depsang and the Rimu but also K 32 in the Nubra-Shayok range and the distant Gasherbrum of the Baltoro basin. We slipped swiftly down the other side over long slopes of shifting detritus to where the Gurkhas had pitched our camp at the bottom.

Next day the weather was not so good and we did not make a station, but contented ourselves with ascending the valley. The wide pebbly bottom was cut by the river, which now divided into several channels and now reunited; the main current, however, flowed at the foot of the steep earth bank on the left, obliging us to cut across the slope above the sliding soil. The weather went quite to the bad in the end, we had rain and then snow.

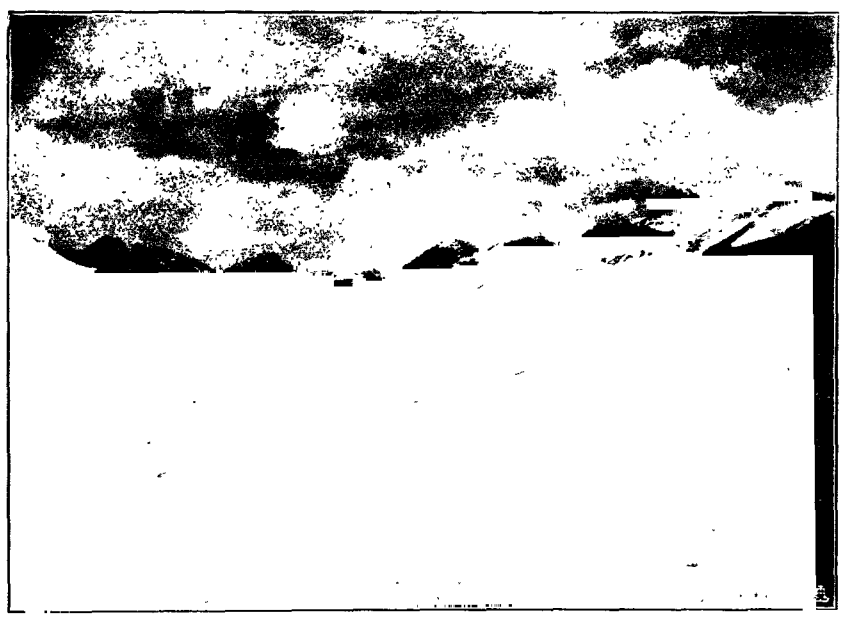


[*Phot. Spranger.*

Glaciers covering the right side of the first tributary on the west of the Yarkand valley.

We reached the upper part of the valley, where it widened out into a flattened basin covered by fine detritus. Two glaciers came into it from the south; on the west the whole width of the valley was blocked by a high wall of ice, the extremity of the northern branch of the Rimu, which we thought we had recognized from the station made four days previously on a peak to the north of the little lake. A wide short tributary comes from the north-west into the principal valley at a little distance from the snout of the glacier; we walked up it almost to the foot of a broad, rounded, glacier-covered saddle, and put up the tents at the base of a sharp and slender needle of rock. Opposite us, the right flank of the valley dividing it from the northern branch of the Rimu was covered almost from top to bottom by huge parietal glaciers. The left or northern side of the valley, however, was quite free from snow and ice. There was no trace of vegetation and the next day we sent the coolies farther down to collect *burtze* for the kitchen.

We ascended the pass at the head of this tributary in fine weather, though the wind was strong. A glacier comes in from the south covering the saddle, flowing down on either side of it, and giving rise to the streams that descend on both slopes. Beyond the pass stretches a valley flanked by high mountains that soon hide it from sight with their overlapping spurs. At that time we thought this might be a tributary, which would run into the Yarkand valley a little lower down; but we later agreed that the junction



[*Phot. Spranger.*

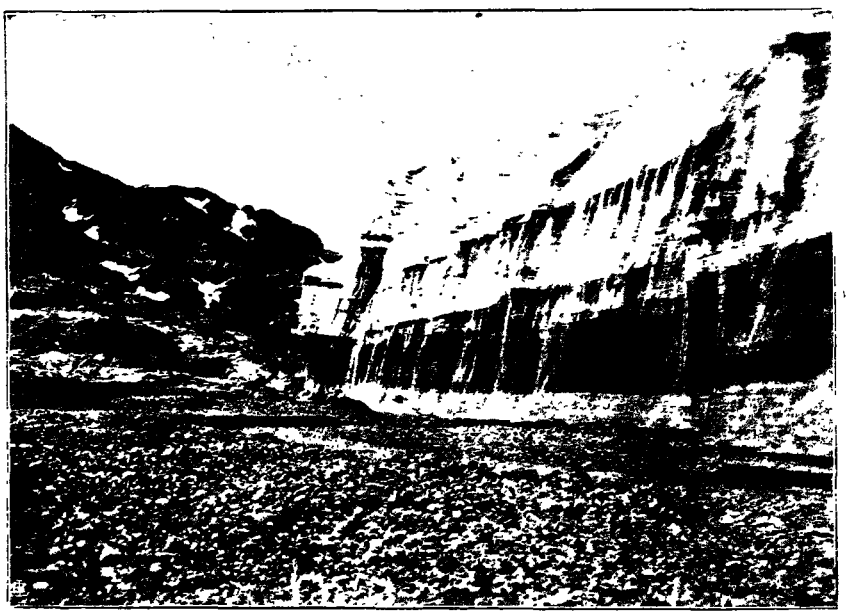
Large valley west of the saddle, lying at the head of the first western tributary of the Yarkand (Shaksgam valley).

must be much farther off, and that what we had here would probably prove to be the origin of the Oprang (Shaksgam) valley, which joins the Yarkand valley after skirting for a very long distance the foot of the northern slopes of the Karakoram chain.[1] In the

[1] The Shaksgam valley, running longitudinally between the Karakoram and the Aghil ranges, was discovered and its lower and middle part explored by Colonel Sir Francis Younghusband in 1887 and 1889 (see *The Heart of a Continent*; London, 1896, pp. 185 and 287). Since then he has explained the error in his map, which places the source of the Shaksgam too far west (*Geog. Jour.*, LXVIII, 1926, p. 228). Twelve years after our expedition, in 1926, Major K. Mason crossed the pass first reached by Wood and Spranger, and explored the valley beyond, confirming their surmise that it was Younghusband's Oprang valley, since called Shaksgam (see "Mason's Exploration of the Shaksgam Valley and Aghil Ranges, 1926," *Records of the Survey of India*, XXII). In 1929 Professor Desio and Colonel Balestreri, of the Duke of Spoleto's expedition, completed the exploration of the valley and surveyed the portion of it lying between the two earlier expeditions of Younghusband and Mason. (F.D.F.)

evening we enjoyed a clear sunset, all the limestone peaks around us glowed with warm colours shading from orange to pink and deep dark red—an unusual phenomenon in the Karakoram where at sunrise and sunset the snow, rocks and sky are at most but faintly tinted.

Returning into the larger valley, we investigated its relation to the Rimu basin. We climbed a rocky height above the left side of the glacier, but could not see far towards its upper course, so we left Shib Lal there to make a plane-table station and turned



Phot. Spranger.

Front of the offshoot of the northern branch of the Rimu, source of the Yarkand river.

towards the right side of the valley, crossing it just below the snout of the glacier. From that vertical wall of ice, 100 feet high, issue the streamlets which are the origin of the Yarkand river. We entered the narrow gorge between the terminal portion and the right flank of the valley where a marginal torrent flows. We clambered over blocks of ice fallen from the edge of the glacier or from the fronts of the tributaries on this side of the valley, and over ice bridges formed by projections from the side of the Rimu. At length we emerged from the gorge by ascending some slopes of detritus on the valley's side, leading to a height on the ridge, whence we had a perfect view of the great basin. There was no longer any doubt: the great northern branch of the Rimu extended westward before our eyes; just below us it flowed through a wide opening into the main trunk, after having sent north-eastward into the Yarkand valley that offshoot which had actually led us to this point.

We had here, in fact, another case of uncertain watershed, formed by a glacier coming down from a height, dividing on the saddle at our feet and continuing its descent on the two slopes. The broad short branch gave rise to the Yarkand river; the other mingled with the great ice-stream of the Rimu whence the Shayok springs.

Two days after us, Alessio and Abetti made a station at this same point, and Antilli took panorama D, which shows far better than any description this singular break in the watershed between India and Central Asia.[1] We got back after nightfall to the tents, having lost time in fording the Yarkand at its source, swollen as it was by the afternoon melting.

In the next two days we went back down the valley to our old camping-place below the lake basin, where we had left a store of provisions. We had, in fact, decided to continue down the valley to find out its bearings and definitely ascertain that it was the Yarkand valley.

On July 17th and 19th we made two more survey stations, on salient points of the ranges left and right of the valley (17,750 feet and 18,620 feet). The limestone peak I have mentioned, above the little lake, is a relatively modest height (20,500 feet), but being striking in appearance is the most easily recognizable point of reference in the whole region; partly because it looks like an enormous castle, partly because it is visible from every side and from a great distance. It is also clearly seen from the halting-place called Balti Bransa on the caravan route north of the Karakoram.

On returning from our second station on a rounded peak to the right of the valley (18,620 feet) we found ourselves in danger of being cut off from the camp and having to spend the night in the open. We had forded the river without difficulty in the morning, but now even before we reached the bank we heard the roar of its evening flood. Wood hurried ahead, to send back some porters from camp to help. He succeeded in reaching the opposite bank after being twice knocked off his feet by the current. When I reached the bank, with the porters carrying the instruments, it was almost completely dark. We could hear the water, but not see it. I was afraid to wait, lest it become entirely unfordable; so in we waded, in a chain, trying to seek out the shallows, often up to the waist in water and constantly shifting our course, as directed by the more experienced coolies. The men staggered along, shouting their *om mani padme hum* above the roar of the waters. After some 120 yards, we all came safely to shore and presently on the other bank met the relief-party, which allayed our anxiety about Wood.

The whole of July 20th we continued down the valley. It preserved the same characteristics: the large level bottom, filled by the river-bed and flanked by alluvial cones at the openings of the tributary valleys, between monotonous slopes of brown detritus. The valley gradually broadened out; while the river, divided into several branches, gradually increased in volume. After a long stretch north-westward almost in a straight line, the valley takes a wide curve to the north-east. Here a marshy tract

[1] See above, pp. 337–8.

with scattered clumps of *burtze* compelled us to leave the valley bottom for the barren slopes of some low spurs. A little farther on we crossed the opening of a large tributary valley, with a considerable stream coming in from the west. We promised ourselves to explore it later, and continued our march down the principal valley to the northern end of a great open space, where another important tributary comes out from a narrow rocky gorge. Here we made our camp, in a drizzle that later turned into a downpour.

We were now over 43 miles from the source of the river, and the valley continued to descend northward, as far as the eye could reach, spreading as it went. There was no possible doubt that this river, which was fed by the northern branch of the Rimu glacier, whose course we had followed for so many days, was indeed the Yarkand.

It was now time for us to return to our programme: the exploration of the chains and valleys forming the watershed between the Rimu and the Karakoram Pass. On the morning of the 21st, in heavy rain, we packed up the tents, and turned eastward. With the help of a rope our caravan got across the river in groups, a little farther up, where it was divided into several channels; we went up a tributary valley that runs parallel to the principal one for 12 miles, behind the range where we had made the station on July 19th (18,620 feet). A stream of clear water ran there in a deep bed, which in some parts becomes a dark gorge between high rocky walls whose tops almost meet. We went along the easy slopes above it and stopped on the side of the valley in a delightful meadow of thick grass starred with little Alpine flowers; to add to the charms of that green oasis the sun came out.

Next day we crossed the saddle at the top of the valley, and went down another tributary of the Yarkand which led us again to the principal valley through a gorge between high walls of reddish rock. A short slope separated the mouth of this tributary from that of another one on the east a little farther up.

We decided that it would advantage our explorations and our survey to go up this last in order to cross the massif that separated us from the caravan route; which, according to our map, we ought to regain at no great distance north of the Karakoram pass. One of the Gurkhas, with 12 porters, went to fetch our few remaining provisions from the depot in the Yarkand valley; Wood and the other Gurkha had the luck to kill two antelopes; so we were amply provided for, till we should again reach our first cache south of the Karakoram pass.

The narrow valley ended at the top in a plateau with a little lake, surrounded by slopes covered with detritus, which were crowned by limestone peaks of dolomitic shape. We stopped here on July 25th to make a station on the peak (18,490 feet) north of the little lake. A descent of a few miles then led in no long time to the caravan route of Central Asia a little below the camping-place, Balti Bransa. It was easily recognizable from the bones and carcases of horses and camels. Thence we crossed the Karakoram Pass, stopping to make a station on the rounded mountain east of it. The day had been very cold and the next day when we got up it was snowing. One of the coolies seemed

ailing and thinking that he was suffering from the cold we left him to rest a little longer, with a companion to help him over the short stage down the valley. We descended in less than an hour and camped at Pulo ; but had hardly set up the tents and lit the fires when the coolie who had been left to help the sick man arrived with the sad and unexpected news of his death.[1]

The next day, July 29th, while the men were burying their unfortunate companion, Wood and I climbed up to make a station on a peak north of Pulo (18,750 feet) ; in unsettled weather, with gusts of sleet driven on an icy wind.

We now proceeded to explore the southern slopes of the range in order to establish the course of the watershed and complete the map drawing ; visiting in turn the valleys that descend to the Chipchap river from this part of the chain. The nearest one joined at Pulo the valley that comes down from the Karakoram pass. We entered it on the morning of July 30th ; it had been snowing all night, but the weather was clearing. The valley bottom was scattered with fossil shells of every size, in such quantity that we made a pyramid of them more than 3 feet high, as a signal to the geologists of our party. We went about 4 miles up the valley ; then by one of its southern slopes we reached a saddle and a near-by height which was an excellent place for a station, giving an extended view over all the ranges far and wide. Thick clouds rested on the mountains round the Rimu, otherwise the sky was clear. From here we went directly down to the bank of the Chipchap.

We spent next day completing the calculations of our last stations ; then we proceeded towards another valley that descends from the watershed to the Chipchap, and camped in a little secondary valley. The streams in this tributary and in the larger valley a little before their confluence flow in deep gorges which in some places are so narrow that one can stride across them. After their confluence the two proceed in a narrow trench cut out in the limestone and conglomerates. The weather was again unsettled, and soon it began to snow, continuing almost uninterruptedly for two days and a half and imprisoning us in our tents. We passed the time in finishing our computations.

At last on the morning of August 6th we were able to take the road again, in snow nearly two feet deep, but melting rapidly. We went over the side of the gorge into the principal valley, which we ascended to the foot of a rocky defile, where the stream came down in a series of little cascades. There we camped. Next day it was easy to reach the rounded summit of a mountain on the watershed at the head of the valley (19,920 feet) by climbing up snow-fields and a small glacier. The weather was perfect, and we had before our eyes the greatest mountain panorama that we had yet enjoyed, from K 32 of the Shayok-Nubra range, with the immense cascade of ice on its northern wall, to the distant Gasherbrum of the Baltoro basin with all the chains and peaks that surround the Depsang plateau, the Karakoram pass and the Rimu glacier.

[1] See note on p. 344.

When we had returned to the valley and gone down about two-thirds of it, we crossed its left flank into the next valley where we were lucky to find a fair quantity of the precious *burtze*, and even a miniature meadow a few yards square, on which we pitched our camp. The next day, in uncertain weather, we climbed the peak (19,880 feet) at the top of the valley and with great difficulty succeeded in taking the angles of a good number of peaks, often interrupted by gusts of driving snow carried on a bitter wind. We had reached the edges of the Rimu basin, into which a broad valley descended west of our station. We left to Shib Lal the task of surveying it and after spending another day in computing our observations we went down directly to the Chipchap, and arriving at the caravan route, returned to the Depsang camp on August 12th, thus ending the first stage of our explorations.

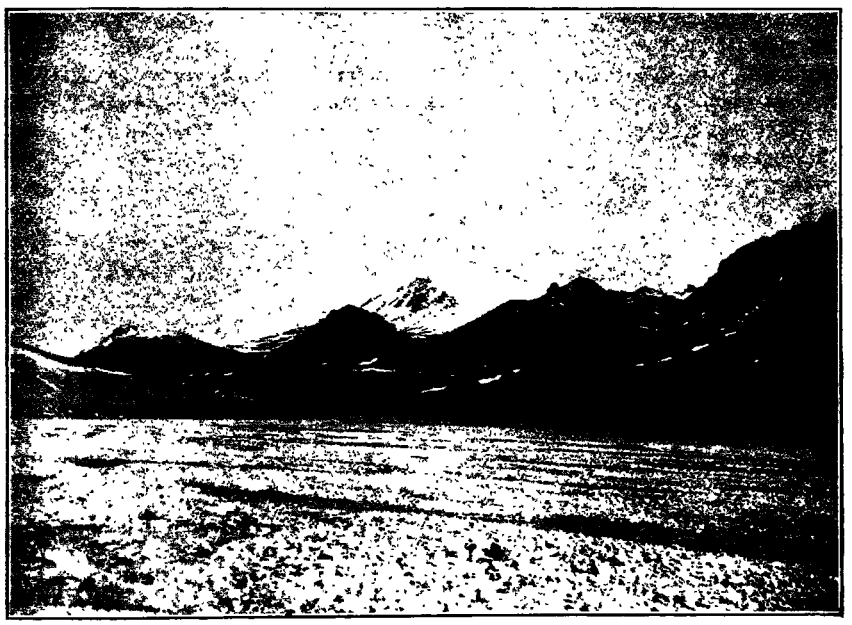
Phot. Spranger.

Rocky gorge in a small tributary valley of the Chipchap, which descends from Peak 19,920 of the watershed range.

On August 22nd the expedition, which had crossed the Karakoram the day before, camped at the foot of a rocky spur at a spot called Baksum Bulak (or Tashnatube), and next day divided once more into several groups. Shib Lal, with a few coolies, went westward to enter the upper Yarkand valley at the lowest point reached by Wood and myself, near the mouth of the third big tributary valley from the west. I was to take a longer route, descending the whole of that branch of the Yarkand that comes from the northern slopes of the Karakoram pass, as far as Kufelang, where it unites with the principal branch that rises in the Rimu glacier; and then climbing the hitherto unexplored portion of the larger valley until I met Shib Lal. As for Wood, he accompanied the expedition to Suget Karaul, in order to help in the geophysical work. He would rejoin me later at Kufelang to explore the western tributaries of the upper Yarkand. Jamna Prasad and Petigax were coming with me, and a transport caravan of camels and horses would accompany us as far as Kufelang, then continue down the Yarkand with supplies for the expedition in its proposed exploration of the Shaksgam valley. I took nine

days to descend the tributary of the Yarkand to Kufelang, during which time I continued to extend our net by making five stations at various salient points of the valley.

The wide and barren valley descends with a slight and uniform slope between not very high ridges as far as Ak-Tagh, a halting-place where the caravan route divides, one branch going north to the Suget pass in the Kuen Lun, while the other continues to descend the same valley north-westward to its mouth in the Yarkand valley at Kufelang. Just above Ak-Tagh we saw, to our surprise, on a slight rise in the ground, a solid round stone structure, identical with a certain variety of *mani* wall which we had already found



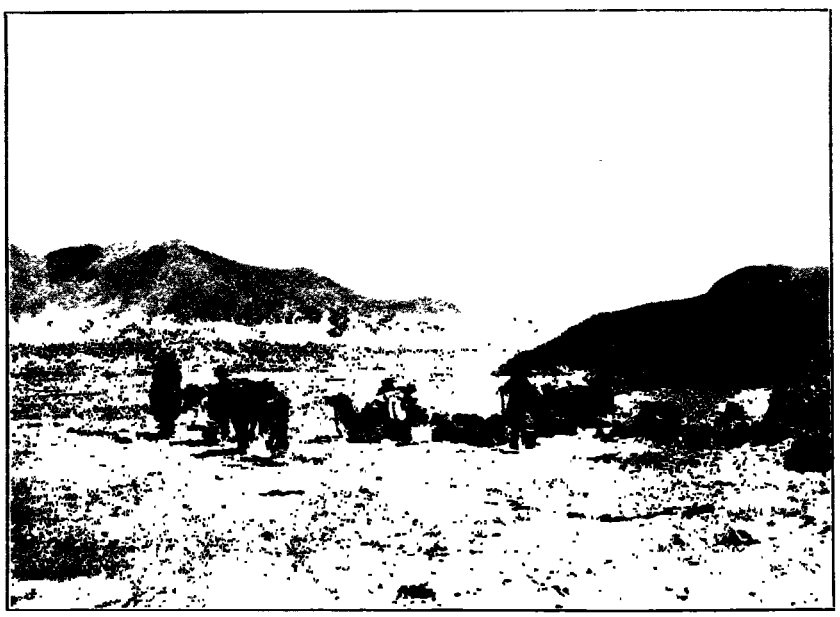
[*Phot. Spranger.*

Snowy summit at the head of a valley tributary to the Chipchap, where we made Station 19,920 on August 7th.

in Ladak; some of the stones actually had the usual invocation scratched on them, leaving no doubt of the Lamaistic origin of the monument.

Patches of snow, remains of the bad weather of the preceding weeks, lay here and there on the pebbly soil of the broad Ak-Tagh plain. Around the melting snow were blades of young green grass, too thin and short and scanty for our camels to nose out. I stopped four days at Ak-Tagh, partly to make a station on a high mountain near by, and also to give Jamna Prasad time to make an excursion eastward to survey the land and the course of the tributaries which came down from that part of the valley. Below Ak-Tagh the valley bends north-west and then west, then gradually narrows until

it becomes a real gorge, which opens into the great Yarkand valley at Kufelang (14,390 feet), where we again saw bushes growing, and shrubs with slender red shoots a yard or so long. The Yarkand enters the plain of Kufelang from the west, and below it flows north into a narrow, winding gorge. The main course of the river skirts the western side of the valley, but the whole plain is water-soaked and criss-crossed with innumerable branches. In times of flood it must be completely submerged. We pitched the tents in a dry tract between two streams, among quantities of dry uprooted shrubs and roots that served to feed a cheery blaze very different from the little *burtze* fires which were all we had had till now.



[*Phot. Spranger.*

Darwaz Sarikot, between Baksum Bulak and Ak-Tagh.

A few hours after us a large caravan from the Yarkand valley arrived at Kufelang, laden with merchandise from Kök-Yar in Central Asia and bound for Ladak. It camped a little above us on another small island in the swamp. We traded a little tobacco and some tinned preserves with the Kirghiz drivers for some onions and dried apricots.

On the day after our arrival, the 31st August, I climbed a peak east of the valley to make a station. The atmosphere was thick on the north, but clear and transparent to the south, where we enjoyed a wonderful view, including the limestone mountain overlooking the small lake of the upper Yarkand, K 32, the three Gasherbrums, Broad Peak on the Baltoro, and the tremendous northern wall of K 2, a precipice of rock almost

entirely free from snow that rose 7,000 feet above the white mountain-tops lying between us and the main range of the Karakoram.

The next day Jamna Prasad, with 11 coolies and all the pack-animals with their Kirghiz leaders left us to go down to Kirghiz Jangal, below the gorges of the Yarkand, to await the arrival of the expedition.

Petigax and I spent another week at Kufelang; we had bad weather, a thick air, mountains covered with cloud and snow falling at intervals. At last, on the afternoon of September 8th when it was beginning to brighten, we were joined by Wood and a

Phot. Spranger.

Camp at Kufelang.

caravan of 18 horses with their drivers, and a small herd of goats and sheep as food for the Kirghiz.

The next day we began at once to ascend the Yarkand valley to connect with the triangulation and survey we had done in the upper valley. For two days we followed the valley southward to the opening of the higher of the two large tributaries that come down from the west. The rains had swollen the river, and some of the fords at points where it ran in a single channel were not pleasant or free from danger. Two of the horses were knocked off their feet and their loads got soaked. Fortunately they were not carrying either the scientific instruments or our sleeping-bags. The first evening we camped on the right bank at the foot of a steep wall, opposite the mouth of a minor tributary

shut in by low hills. The next day having sent ahead the caravan we climbed up the peak at whose base we had encamped, to make a station, in spite of the thick and misty air. We came down again into the valley, passing the mouth of the lowest left-hand tributary, and went on to the upper one, which we reached after dark and made our camp. On the way a coolie had overtaken us with the post; and that evening by the light of two lanterns held by Petigax and me, Wood read to us from the Indian papers the first details of the War; the siege of Liège, England's entry into the conflict, and the engagement of British troops at Mons. We stopped a day, in unsettled weather, writing letters

[*Phot. Spranger.*

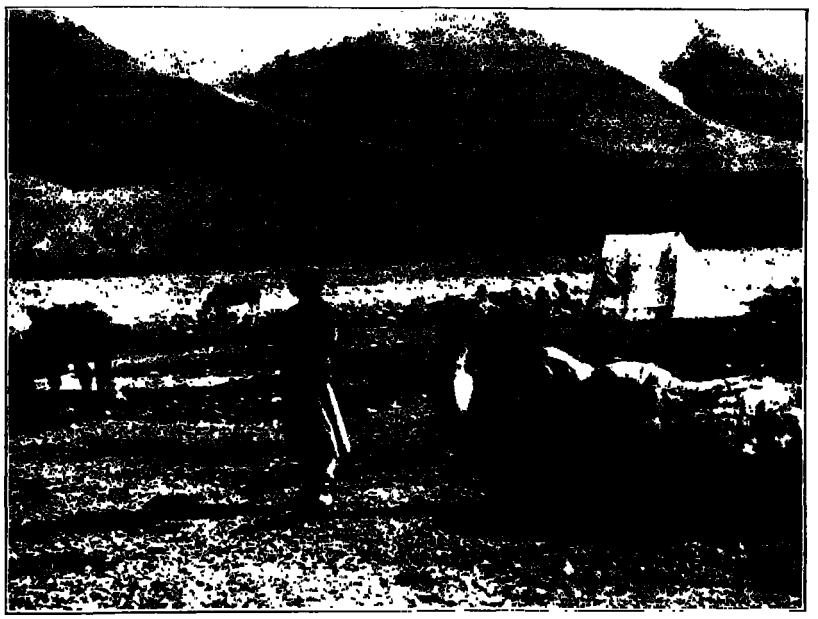
From a station above Ak-Tagh, looking westward.

to Europe to give to the same man, and entering our calculations. Two of the guides from Sanju had deserted during the night, taking six horses with them; we sent some Kirghiz in pursuit but in vain. However, they brought back two camels that they had found straying some miles farther down the valley, which almost made good our loss.

On the morning of September 12th we entered the tributary valley with the purpose of exploring it throughout its length. It was open and level lower down, but narrowed above between precipitous walls; we had to climb up the right side to a point above the defile. On a level grassy place we found signs of game, and a path trodden by animals. About 10½ miles above our yesterday's camp the valley was barred by two great glaciers, which descended from parallel valleys on the right side, and thrust out

across the whole width of the principal valley. We made a halt at the bottom of the valley, immediately below them. The next day, leaving the caravan to find its way through this barred stretch of valley, we went up to a height on its left flank exactly facing the two glaciers.

The lower one was extraordinary in shape and appearance. We could see it coming down at a slight incline from a ring of low mountains to the brow of the steep side of the valley, where the whole icy mass fell in a wide gully like a cascade of séracs, confined by two ridges of moraine, to the level of the valley, where it spread out in a great lacy



[*Phot. Spranger.*

In the second western tributary of the Yarkand valley.

white train. The mass of ice crossed the valley to the opposite wall, where certain polished rocks showed that in the past the glacier had been of much larger dimensions. The stream flowed under great bridges of ice joining the two banks. The heavy clouds thickening on the Rimu and Karakoram chains and the continual gusts of rain and snow made observations difficult and unsatisfactory. We returned to the valley, descending the opposite slope of the mountain ; after crossing the terminal moraine left by the second glacier, we found our tents set up on a large marshy plain that probably represented the bottom of a small lake that had once formed above the two blockading glaciers.

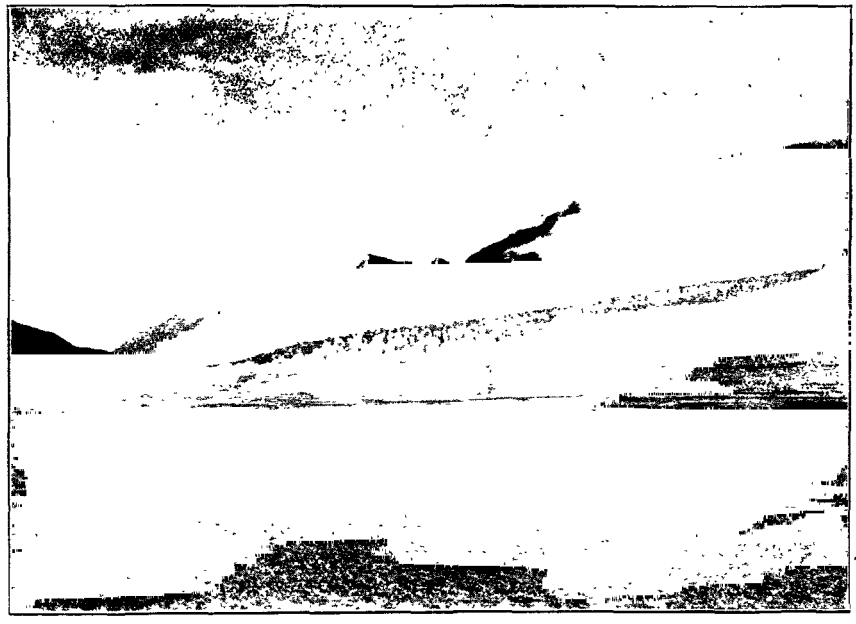
From this point we reached the head of the valley in one stage. At the entrance to the upper basin, another glacier comes down from the south, covered with moraine

[*Phot. Spranger.*

Glacier coming down from the right side of the second western tributary of the Yarkand valley.

detritus, and bars the valley, leaving only a narrow passage for the stream, which hurls itself against the great boulders that fill up the narrow space between the front of the glacier and the opposite side of the valley.

Wood climbed up on the glacier and crossed its front, while Petigax and I cut across the steep left side of the valley, covered with loose stones above the defile where the torrent ran; we came out above the glacier in a great amphitheatre of mountains, with glaciers coming down from the south and south-west. Towards the north-west was a saddle, not very high and without snow. Wood decided to make a short reconnaissance



[*Phot. Spranger.*

The higher of the two glaciers which obstruct the second western tributary of the Yarkand valley.

through a little glaciated valley on the south; while Petigax climbed the col to the north-west, and I went down the defile again to pitch camp on level ground below.

Wood reached a height near the upper basin of one of the southern glaciers, surrounded by short valleys which lead to not very distant saddles. Petigax had seen beyond the northern saddle a valley that descended westward and looked easy to traverse.[1]

[1] In his expedition of 1926 Major K. Mason completed the exploration of this valley, which he called the Lungma-chhe. He first entered it at its head from the Shaksgam valley, over one of the southern passes mentioned above (the Marpo-la) and left it by a western pass, the Sa-kang-la, leading to the Sa-Lungpa valley, a tributary of the Shaksgam. Later he recrossed the latter pass and went down the whole Lungma-chhe to its junction with the Yarkand (*op. cit.*, pp. 36 *sqq.* and 57 *sqq.*). (F.D.F.)

The next day we made a station on a ridge of the northern side of the valley head, but we could not reach a snowy peak on the watershed of the valley because it was too difficult for the coolies. In spite of the thick atmosphere, we managed to survey the peaks around the head of our valley, and the half-veiled ones of the mountain group between us and the upper basin of the Yarkand. But the mountains of the Rimu and of the principal watershed were wrapped in heavy cloud. Meanwhile it was evident that there was a considerable distance between the end of our valley and the watershed of the Karakoram, formed to the south of us by the Teram Kangri range, that overlooks the Siachen glacier. This space was occupied by the head of the big valley to the north of the Rimu, which had faced us on July 13th from the saddle at the head of the first tributary of the Yarkand, and which we had surmised to be the upper Shaksgam.

Leaving Shib Lal with his coolies to survey the upper amphitheatre of the valley, we began the descent to the Yarkand valley. On September 17th we made a successful station on the ridge to the left of the valley. Northward extended a wild labyrinth of bare mountains, all detritus and broken-up rocks, while on the distant horizon one caught sight of a range of snowy peaks. Westwards the view was broken by an ice-bound ridge. Late the same evening, we again camped at the opening of the third western tributary in the Yarkand valley, where we had pitched our tents on July 20th during our first excursion.

The next day we climbed a red sandstone mountain, 17,525 feet above sea-level and made a station; after which we started to explore this tributary as well. We had some difficulty in persuading the coolies, both the Kirghiz and the men from Kargil, who were growing tired of all this marching up and down valleys to no apparent purpose; but they consented in the end to continue in our service. Just as we were leaving camp on the morning of the 19th a messenger arrived with the Indian mail, and we delayed our departure to read news of the War: the fall of Namur, the entry of the German army into Brussels and the death of Pope Pius X—this last being the only news from Italy.

The four days that followed were the most trying and unpleasant of our whole campaign. This third tributary was very different from the second. It was almost entirely a very narrow, wild and winding gorge, without a blade of grass or a sprig of *burtze*. It was carved out among impracticable rocks, which forced us to proceed along the very narrow bottom, fording and refording the stream that filled it. The sides of the valley were crowned by rounded hills, without glaciers, of a monotonous and uniform design. Overhead hung a sky covered with dark cloud masses. The evening of the first day we camped 9 or 10 miles from the Yarkand valley. The porters were drenched; what was left of our little herd of goats, and the one surviving sheep, bleated piteously; their wool was covered with frost, and they tried to seek shelter in the tents.

The next day it snowed so heavily that the slopes and stony bed of the valley were

[*Phot. Spranger.*

Circle of glaciers at the head of the second western tributary of the Yarkand valley.

soon covered, making the road much harder for the horses and men. The frost of the night before had frozen the water along the river-banks, which complicated our fordings. I counted more than 50 crossings in that day's march of about 15 miles. We pitched the tents on a little level in the valley bottom at the upper opening of a gorge so narrow that we had been obliged to walk in the stream itself. We burnt what *burtze* we had, scarcely enough to heat a little tea. We had left the Primus oil-stoves in the main valley, thinking that there would be scattered *burtze* bushes here as before; whereas we found ourselves in the middle of a stone-quarry without a shred of vege-

[*Phot. Spranger.*

Between the gorges of the third western tributary.

tation, and covered with snow, which went on falling heavily. The coolies, worn out with the hardships of these two days, wet to the skin, were huddled in their tent, without any means of drying their clothes, or cooking their tea and *satu*. And three of the horses were so worn out by the hard marches, the cold and lack of food, that they were not fit to go on, except with very reduced loads.

Added to the weather was the lateness of the season (September 20th), which left little hope of better conditions. Whatever regret we felt, there was nothing for it but to give up the idea of reaching the head of the valley, and to retrace our steps. We still tried, in a clear interval, to get an idea of the general disposition of the upper part of the valley, by climbing the heights on the left and right. But all we could see was the valley itself, melting into the dim snow-laden air; at the end of our view it was

cut by a deep gorge where the stream flowed—it looked like a winding fissure in the rock.

Our return was like a flight from that freezing and inhospitable spot. We met a coolie on the way who brought news of our chief and the rest of the party. They had been unable to penetrate into the Shaksgam valley owing to the insurmountable difficulty of the flooded Yarkand, and were now moving towards Central Asia by the passes of the Kuen Lun.

A few miles above the opening of the tributary valley, our porters came on an

[*Phot. Spranger.*

The Yarkand valley from Station 18,510, on the north side of the third western tributary (looking north).

unexpected find, astonishing in a region which we had thought to be utterly unexplored. There were the butt-end of a Kirghiz gun, some earthen pots, two open letters in Turki, and another in a sealed addressed envelope, besides eight copies of the Koran bound in red linen, printed at Rawal Pindi—all this in a good state of preservation. The discovery seemed to confirm the traditions existing in Ladak and in Turkestan of an old direct route crossing the ranges between Kufelang and Khapalu along the lower course of the Shayok, in Baltistan. It did, in fact, seem likely that some traveller had deposited these objects here in this nook in a little lateral valley. Perhaps he was on his way from India to Turkestan, and had been reduced to this extremity through lack of transport; perhaps he had been exhausted by the journey across the high passes of

the mountain chain, and decided to hide some of his less perishable goods, in order to go on with as light a load as possible. The letters were translated for us on our arrival at Yarkand, and seemed to confirm these hypotheses, but in spite of inquiries that were made later, we could not get any news of the traveller in question, who may easily have perished in the swift waters of the Yarkand, in the gorges below Kufelang.[1]

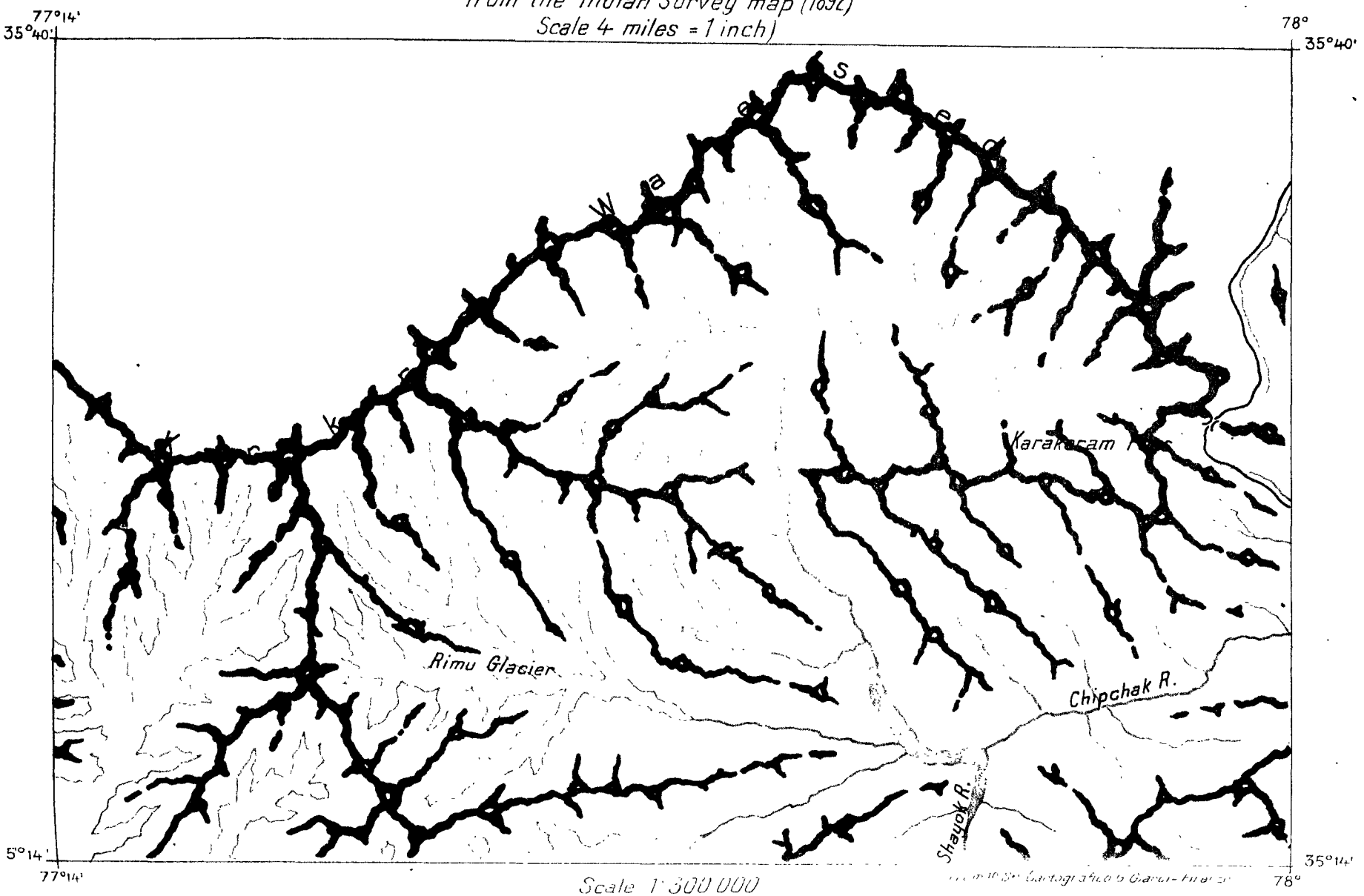
We tried to make a station on Peak 17,870 to the right of the Yarkand, reaching it over slopes covered with fresh snow, and along a ridge raked by an icy wind. From this ridge one commanded the whole stretch of the Yarkand valley from the highest tributary on the west as far as Kufelang; while almost in front of us was the opening of the gloomy defile of the lower tributary valley, from which we had emerged the day before. At our feet the Yarkand flowed in its wide bed, a network of silver threads. We were able to fix our position, but the intense cold and violent wind with swirls of snow, prevented us from extending our operations.

On the evening of September 25th we arrived at Kufelang after making another station on a height to the left of the valley. Here we stayed for three days to finish our calculations, and to wait for the return of Shib Lal, who was completing the survey of the mountainous area to the south of the valley between Ak-Tagh and Kufelang.

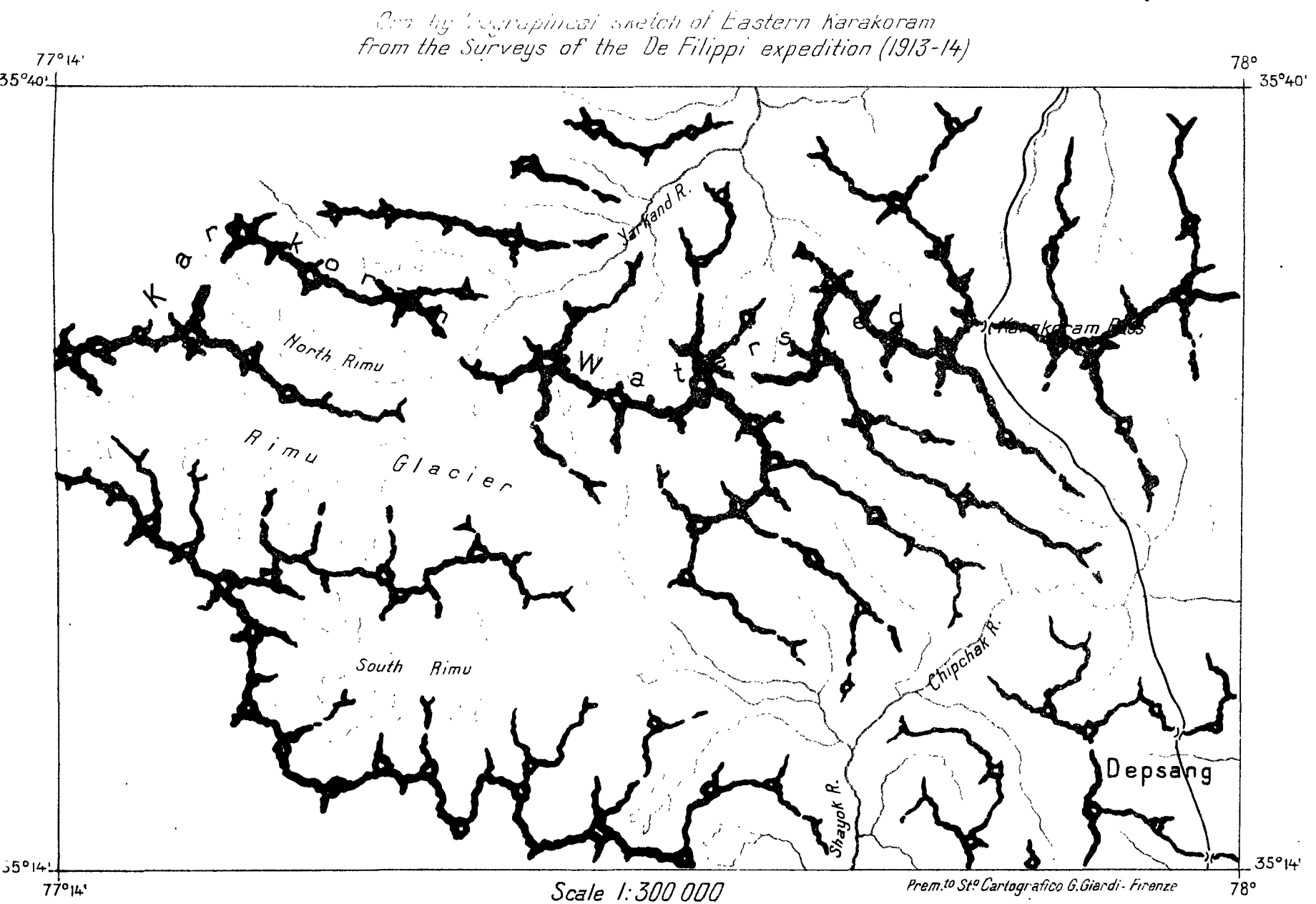
At last, on the morning of September 29th, our little caravan being completed, we left Kufelang in a snow-storm to descend the Yarkand valley toward the fertile oases of Turkestan.

[1] It is interesting to connect these relics found by Wood's and Spranger's party with the discovery of the body of a Balti in the Lungma-chhe, the second western tributary of the Yarkand, by Clifford and Cave of Major Mason's expedition of 1926 (see Mason, *op. cit.*, p. 38). Mason reached some of the head-waters of the third western tributary on the Aghil Depsang plateau, discovered by him, and was able to sketch the vast upper basin of the valley (*ibid.*, pp. 45 *sqq.* and Mason's map). (F.D.F.)

Oro-hydrographical sketch of Eastern Karakoram
from the Indian Survey map (1892)
Scale 4 miles = 1 inch)



Scale 1:300 000


Orographical sketch of Eastern Karakoram
from the Surveys of the De Filippi expedition (1913-14)
77°14'
78°
35°40'
35°14'
Karakorum
North Rimu
Rimu Glacier
South Rimu
Watershed
Yarkand R.
Karakoram Pass
Chipchak R.
Shayok R.
Depsang
Scale 1:300 000
Prem.to St.o Cartografico G.Giardi - Firenze

CHAPTER XIV

TOPOGRAPHY OF THE RIMU GLACIER AND OF THE SOURCE-BASINS OF THE SHAYOK AND YARKAND RIVERS

The maps based on the surveys of the expedition—Comparison with former maps—Previous exploration from Johnson to Longstaff—Remo or Rimu?—Geography and topography of the Rimu basin—The upper Yarkand valley and its tributaries—Traditions of ancient routes between the Shayok and Yarkand valleys.

IT seems an opportune moment to pause for a brief survey of the geographical configuration of the region we explored as described in the preceding chapters; and for a comparison of our data with the existing maps.

The results of the geodetical and survey work of the expedition are contained in the map of the Depsang plateau and the upper Yarkand and Shayok basins, on the scale of 1 : 250,000, which accompanies this volume. It covers an area of over 3,500 square miles,[1] and was surveyed on a scale of 1 inch = 2 miles (1 : 126,718).

Besides this region, there were surveyed, on the scale 1 inch = 4 miles (1 : 253,436) the route up the Shayok valley from the village of that name to the foot of the Depsang plateau; part of the second portion of the Yarkand valley between Suget Karaul and Bazar Dara, and the two roads between the Yarkand valley

[1] A contour map, on a scale of 1 : 100,000, of the Rimu glacier and the plateau was made for the Italian edition of this book. Vol. I, Series I, of the *Relazioni Scientifiche* contains the accounts of Alessio, Abetti and Spranger of the methods used in the survey. The glaciology and geology of the region are dealt with by Dainelli in separate volumes of Series II.

and Karghalik by the Yangi Dawan and the Kukalan Dawan, over the Western Kuen Lun : altogether about another 1,600 square miles.

In order that the reader may measure at a glance the great change which has been brought about in the cartographical representation of the region, I have had made the two accompanying sketches, both on the same scale of 1 : 300,000 and contained within the same co-ordinates. One is taken from the 1892 map of the Indian Trigonometrical Survey, and the other is based on the triangulation and surveys made under the direction of Alessio and Wood.[1]

The two sketches are so different that at first sight they do not seem to refer to the same region. Even the Karakoram pass, which might be supposed to have been located with sufficient precision, situated as it is on the high road between Central Asia and Ladak, and crossed by so many caravans led by Europeans, had been placed much too far east and south ; and the difference in longitude is so great that the Depsang plateau comes into the sketch made from the maps of the expedition, while in the one drawn from the map of India its north-west corner is barely included. In every other detail—the direction and distribution of mountain chains and their spurs, the configuration and course of the valleys and their glaciers and rivers—the two sketches are widely different.

The region represented comprises the source basins of the Shayok and Yarkand rivers, separated by the Indo-Asiatic watershed but joined as by a bridge by the Rimu glacier, the common source of the two rivers. The Shayok flows towards the Indus, which it joins a little above Skardu. The Yarkand, after a winding course among the mountains, comes out in the desert basin of Central Asia, where it unites with other lesser rivers to form the Tarim, which in part loses itself in the sands, in part empties into the Lob-nor, a huge marsh rather than a lake, lying at the south-east corner of the basin.

The fundamental error of the Indian map was that it placed the watershed to the north of the source basin of the Yarkand, forming a great amphitheatre from which a river is made to flow southward which appears to be the source of the Shayok. South-west of this amphitheatre are indicated several isolated fin-shaped glaciers, the central or largest of which is marked with the name of *Remo*. From these flow tributary branches of the Shayok, which broadens out into a long narrow lake-like expansion, into which the Chipchap also flows from the east.

As I said in Chapter I, this portion of the Indian map is founded on data reported by W. H. Johnson, in 1864–65,[2] but we do not know how he obtained them.[3] He

[1] The results of our Survey have been embodied in Sheet 52, A and E of the Survey of India Map, issued in 1928 and 1929.

[2] See text and note on p. 4.

[3] Johnson's original drawings and surveys seem to have been lost, at least they could not be traced in the archives of the Survey. For the difficulty of interpreting his routes and his topographical work, see two articles, by Major Kenneth Mason and Sir Aurel Stein, in the *Alp. Jour.*, Vol. XXXIV, 1921, pp. 54 and 62 ; also a note in the *Geog. Jour.*, Vol. LIX, 1922, p. 310, and Wood's discussion in the *Postscript* to his Report (Dehra Dun, 1922).

does not appear to have entered the upper Yarkand valley, nor to have ascended the Shayok river beyond its confluence with the Chipchap. In the map (30 miles = 1 inch) which accompanies the story of his journey to Ilchi (Khotan) in the *Jour. Roy. Geog. Soc.* (1867) his itinerary is shown to be that of the direct routes: on the way out by the Tibetan plateaux, on the way back by the Karakoram pass, the Chipchap, the upper Shayok, the Sassir pass and the Nubra valley, without any side excursions. The mountain ranges are marked, but not the glaciers. The Yarkand river (called Tinzap) is made to rise in the plateaux to the south-east of the Karakoram pass, near the actual source of the Kara-Kash.

Four years after Johnson (in 1869), Robert Shaw and G. W. Hayward penetrated into Eastern Turkestan, and both brought back information that was certainly more exact about the region where the Shayok and Yarkand rise. It is strange that this was not embodied in the maps.

Shaw's description of the Rimu glacier and the basin in front of it which he crossed on the return journey from Kashgar is especially worthy of note. He writes:

"At the distance of a day's march south of the (Karakoram) pass, you come in sight of a range of real glacier mountains. The Shayok River, one of the sources of the Indus, rises in a perfect ocean of ice, far more worthy of that name than the Mer de Glace of Chamounix, which is rather an ice *river* than a *sea*. Two glaciers, coming down from stupendous peaks, unite and overflow a large plain with their blue waves. . . . Terraces and other marks of the former existence of a lake extend to a height of 200 feet up the sides of this plain and of the gorge by which the stream escapes. There are the marks of a lake which has repeatedly been formed here by the glaciers blocking up the ravine below. . . . But I think the marks are too considerable to have been formed during the short existence of recent lakes, and rather point to repeated phenomena of the same sort in earlier times."[1]

This description is accompanied by a coloured plate of the Rimu seen through the gateway formed by the two spurs at the entrance of the glacial basin.[2] And moreover, in another place Shaw says that he had observed that the Karakoram pass is not situated at the head of the valley which ascends from the Chipchap, but is in a saddle of the watershed on its left flank; whereas the valley leads to a pass a little farther up, from which descends a water-course; his caravan-men told him that the water-course flows into the Yarkand. He adds that this stream cannot turn south to flow into the Shayok, because a careful examination did not disclose any opening in the mountains to the south-west.[3] Thus Shaw even then correctly stated the oro-hydrographic conditions as established by Wood's explorations.

[1] Robert Shaw, *op. cit.*, p. 432.

[2] Hermann von Schlagintweit (*Reisen in Indien und Hochasien*, Vol. IV, p. 323) considers the picture inaccurate, the contrast being too strong between the glacier, which flows level like a river and the very steep mountains from which its branches descend. But it is correct none the less, as shown by our panoramas and by the illustration on p. 319.

[3] See Robert Shaw, "A Prince of Kashgar on the Geography of Eastern Turkistan," *Jour. Roy. Geog. Soc.*, Vol. XLVI, 1876, p. 277.

It remains to speak of Hayward.[1] Apart from his discovery of the upper Kara-Kash, which he found where Johnson had located the source-basin of the Yarkand, there is his exploration of the latter river, of which I will give a brief account. Eluding the vigilance of the soldiers of the Atalik Ghazi, then sovereign of Eastern Turkestan, who kept their eyes on him while waiting to hear from higher quarters whether to allow him to proceed or to send him back, he managed to leave Shahidulla on November 26th, 1868, with only three Ladaki servants. He took with him a week's provisions, no tent, and no means of defence against the very severe winter of those regions with a temperature of 18° below zero F. He reached the Yarkand valley by the Kirghiz Jangal pass, and followed the valley downwards for a time, then turned and went up it. On reaching Kufelang he observed that the branch of the river coming from the Karakoram pass was much smaller than the one from the south-west, and naturally followed up the latter. He passed the mouth of the two western tributary valleys explored by Wood and Spranger, and on December 8th came to a broadening of the valley partly occupied by a small lake below the point where Wood and Spranger, coming from the foot of the Karakoram pass, first set foot in the valley. In this basin, 15 miles from the Rimu glacier, Hayward believed he had found the source of the Yarkand; not seeing that the valley continued above it, a mistake for which probably the wintry landscape, the frozen river and snow-clad mountains were responsible. Moreover, he was ignorant of the existence of the Aghil range, and thought that the left side of the Yarkand valley was actually the Karakoram range.[2]

After Shaw, Sir Douglas Forsyth, on his second mission to Eastern Turkestan in 1873, passed through the Kumdan gorge and within sight of the Rimu glacier. He says:

"From Kumdahan we marched for ten miles to Gyapshang" (Yapchan, at the confluence of the Shayok and the Chipchap) "near which, to the north-west, is a vast glacier region, in which the Shayok takes its rise and, as is supposed, the Yarkand river on the other."[3]

Lieut.-Colonel Gordon, who covered the same route as Forsyth, gives two coloured plates of the Rimu glacier in his book, showing it as he saw it from a distance after ascending a good stretch of the Chipchap from Yapchan. He says:

"The Remu [*sic*] glacier . . . rises amongst peaks and ridges from 19,000 to 24,000 feet high. It is about 21 miles in length and from 1 to $1\frac{3}{4}$ miles broad, terminating at an elevation of 15,800 feet above the sea with a width of about 3 miles of gigantic cliffs of ice fully 250 feet high."

[1] See his account, already cited, in *Jour. Roy. Geog. Soc.*, Vol. XL, 1870, p. 33.

[2] This intrepid traveller, who was endowed with exceptional physical endurance, had his career cut short a year later. He was murdered, while attempting to reach Pamir, by Mir Wali, ruler of Yasin in the upper Gilgit valley. For his accounts see Vol. XLI of the *Jour. Roy. Geog. Soc.*, 1871, pp. 1 *sqq*; and for the particulars of his tragic end a letter by F. Drew in *Proc. Roy. Geog. Soc.*, Vol. XV, 1871, p. 117.

[3] Forsyth, *Autobiography*, p. 101.

So far the description fits in, but he continues (influenced by Johnson's map, in which the Shayok is made to rise in a mountain basin north-east of the Rimu and to flow down in front of the glaciers crossing the mouth of the valley):

"This glacier, owing to the action of the river Shyok, comes to an end at a much greater altitude than glaciers in that part of the Himalayan system generally do. The river, cutting away successive blocks of ice, usually prevents farther extension. The glacier, however, has been known on several occasions to protrude right across the valley of the Shyok, so as to dam up the stream and form a large lake, . . . similarly as has been observed of the Kumdan glaciers lower down."[1]

By glancing at the sketch made from maps previous to our expedition, it is easy to see how so much confusion has arisen.

All these explorers had seen the Rimu from Yapchan, 8½ miles or more away. For 36 years after Forsyth the Kumdan glaciers were only visited by Church and Phelps, about 1894, and by Sven Hedin in 1902.[2] It was in August 1909 that Dr. Longstaff and Captain Oliver, British Joint Commissioner at Leh, accompanied by Rasul Galwan, were led to make an excursion west of Yapchan to examine the Rimu at close range. They probably followed the south side of the valley, reaching the small lake I mentioned in describing our route between the Depsang and the Rimu. Beyond it spread before them the magnificent spectacle of the Rimu—of its southern branch, that is; because they could not see the main body of the glacier, or get any notion of its extent, or guess the extent of the northern branch. Longstaff could not get far enough to establish the exact relations of the Shayok with the Rimu; but, even so, he expressed grave doubts on the correctness of the Indian map, and reached the same conclusion as Shaw; which, however, he states more precisely, so that it can be readily understood if read with reference to the two sketches accompanying this chapter:

"The present condition of the Remo glacier is now identical with that shown in Gordon's picture of it taken in 1873. Rasul Galwan was of opinion that it had advanced somewhat during the ten years which had elapsed since he had last seen it. But such advance must necessarily, owing to the great breadth of the ice-foot, be a very gradual affair. I am rather doubtful whether its delineation on the Survey map (44 A south-east) can be accepted as true of the date (about 1864) which it must represent. For if it was correct the Remo glacier and the two large glaciers in the valleys to the north and south of it must each have advanced 8 miles or more, and united to form a huge expanded ice-foot at least 2 miles wide at their point of junction; all this in the course of one decade at the outside, and during a period not signalized by active advance of the Kumdan and Aktash glaciers. It appears certain that no one has ever crossed the Remo ice-foot. Has anyone actually travelled up the northernmost of the Remo valleys which is represented as originating just west of the Karakoram pass, and running west and then south for 30 miles, till it reaches the present site of the Remo ice-foot?" (that is to say, the basin north-east of the Rimu, where according to Johnson the Shayok takes its rise). "If this valley exists as shown, there must be a very big lake in it, for the Remo dams it completely. But judging merely from what I saw later, on my way to the Karakoram pass, I cannot help thinking that a

[1] See *The Roof of the World*, by T. E. Gordon, Edinburgh, 1876, p. 20.

[2] See Dr. Longstaff's account in *Geog. Jour.* Vol. xxxv, 1910, Appendix p. 649; and Dr. Sven Hedin, *The Kumdan Glaciers* in 1902, *Geog. Jour.*, Vol. xxxvi, p. 185.

mistake has been made, and that the source of the Shayok is really the Remo glacier, and not a small rivulet visible from near the foot of the Karakoram pass. I suspect that this westward flowing rivulet eventually drains towards Shahidula, and that the northerly Remo is closed by a mountain wall about 15 miles from the snout of the glacier."[1]

Longstaff's hypothesis has been fully confirmed by our exploration.

As to the region north of the Karakoram, the cartographical representation could only be fanciful before 1889, when Colonel Sir Francis Younghusband revealed the existence of the Aghil range and the Oprang (Shaksgam) valley, between the Karakoram range and the Yarkand valley. Meanwhile it is strange that in the official maps no notice was taken of Hayward's discovery of the main branch of the Yarkand river, and, that for example, the French map *Asia* 10,000,000^{e} (sheet 36° N. 78° E.) still indicates the source of the Yarkand (under the native name of Raskem Daria) as the branch rising on the northern slope of the Karakoram pass.

It was Johnson who, together with the first surveys of the region, brought back the name of Remo for the largest of the glaciers indicated by him to the north of the Kumdan glaciers.[2] When we reached the Depsang plateau, we questioned Rasul Galwan about the name of the glacier, and he replied that it had not got any. He asked the coolies, but they all denied that the glacier had any name whatever. Then Wood offered the enormous sum of 100 rupees to whoever would tell him the name of the glacier, but no one claimed the reward. We took care not to breathe the word Remo or Rimu, because, even without the attraction of a reward, natives are always ready to adopt and confirm whatever name may be suggested to them. Indeed it would be extraordinary if the glacier did have a native name, in a region where only the most conspicuous landmarks on the caravan routes, such as the passes in the mountain chains, the rivers, springs, and the rare patches of vegetation where camps are located, have any name of their own. It was only after a definitely negative result that Wood and I asked if the word Remo had any meaning at all in the Balti, Ladaki, or Turki tongues. We varied the pronunciation until the sound Rimu was recognized as meaning lines, bands, or streaks.

It is possible that some native in Johnson's caravan had pointed out the glacier to him by this name, with reference to the streaks of moraine on its lower portion; and it would be natural for an Englishman to spell with an *e* the sound which in the Latin languages would be *i*. As for the *o* and *u*, they are constantly written alternatively in Anglo-Indian nomenclature, as, for example, Skardu is just as frequently written Skardo; and Colonel Duncan, whom I quoted above, writes Remu.

We did not think we ought to suppress a name now definitely adopted on the maps, in a region where names are so rare; but by modifying it slightly we could at least make it into a word not totally deprived of meaning in the Ladaki tongue, which

[1] See the account by Dr. Longstaff, already cited, in *Geog. Jour.*, Vol. xxxv, 1910, pp. 652–3.

[2] In the account already cited; in Vol. vii, Synoptical, p. xxxviii.

also had the advantage of avoiding an association with Romulus' twin, who has really nothing to do with the Karakoram.[1]

The Rimu was the last of the large glaciers flowing from the southern slopes of the Karakoram that remained to be explored. We had no idea of its actual size, since no one had penetrated into the valley where the main glacier flows, which is not visible from the upper basin of the Shayok.

Rather than a single glacier, it is a system of first-class glaciers flowing together, their united basins having an area of about 270 square miles.

The central and largest glacier is $23\frac{1}{2}$ miles long, the lower half is from 1 to $1\frac{3}{4}$ miles wide, and the upper from 2 to $2\frac{1}{2}$. Towards the middle of its course a tributary glacier, 11 miles long and a little over 1 mile wide, flows into it from the north, whilst its terminal portion joins with a third glacier, $12\frac{1}{2}$ miles long, $1\frac{3}{4}$ miles wide, to form a single snout which terminates the great ice river at 16,340 feet above sea-level.[2]

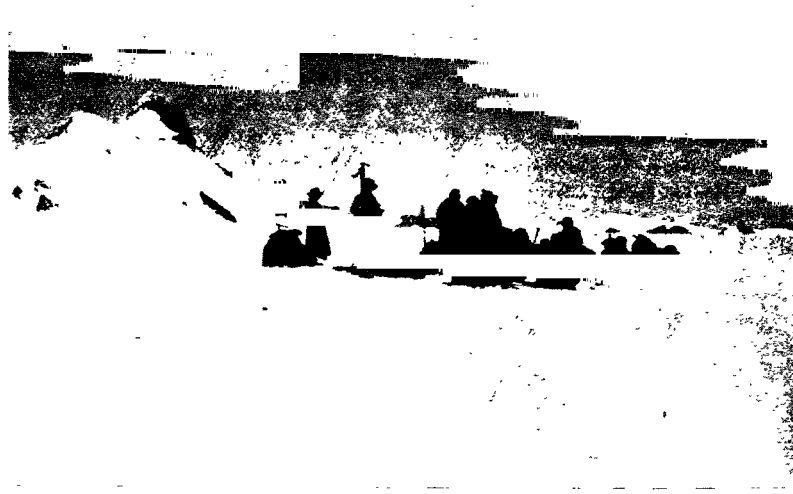
The main trunk of the Rimu describes a wide curve, with a general direction from north-west to south-east. Towards its centre the valley spreads out in a vast basin, $2\frac{1}{2}$ to 3 miles in diameter, into which the northern branch empties. Below this, as we have seen, the glacier is entirely covered with blocks similar to the séracs of our Alpine glaciers, becoming larger and higher, and taking more and more the shapes of towers, pinnacles and spires as one descends. On the other hand, in and above the central amphitheatre, the surface is flat, with broad, shallow undulations. In its lowest third the glacier mass is banked up against the foot of the left (eastern) side of the valley, but does not touch it, a narrow space being left where an open marginal torrent flows. On the other side, the edge of the glacier is separated from the right side of the valley by a space varying between 150 and 600 feet, partially filled by moraine material. But in its upper two-thirds the glacier fills the whole valley. There is a gentle gradient, not much more than 2 in 100, rising barely 2,000 feet in the lowest 16 miles. Then comes a step 600 feet high, above which spreads out the upper basin, 19,500 feet above sea-level, and looking more like a plateau than a valley head. Instead of the ring of mountains which usually surrounds the source basins of glaciers, there is an irregular border of short spurs only a few hundred feet higher, broken by broad saddles through which overflows the glacier that fills the whole basin to its edge. One saddle opens to the north, on the principal watershed, another, to the west, leads to the Tarim Sher glacier, a large branch of the Siachen.

[1] Dr. Longstaff, in reply to my query, considers Rimu more correct and defensible than Remo and fully approves of the name, which was also sanctioned by the Royal Geographical Society (see *Geog. Jour.*, Vol. LIX, 1922, p. 379, note). But the spelling Rimo has just been officially adopted by the Survey of India.

[2] Dr. Hunter Workman (*op. cit.*, p. 260, table) notes that the Siachen glacier stops at 12,150 feet above sea-level, at a much higher altitude, that is, than do any of the other large glaciers of the Karakoram, whose snouts are between 10,000 and 11,000 feet above the sea. The difference is even greater in the case of the Rimu, whose snout is 4,190 feet higher than that of the Siachen.

The upper circle of the glacier, covered by deep snow, is scored in every direction by crevasses, with treacherous bridges and cornices, criss-crossing in a way that made it difficult and dangerous going even under the guidance of a man like Petigax. The Workmans found the same conditions in the high Tarim Sher, that " for 5 or 6 miles is cut up in every direction by great crevasses and openings " so dangerous that they did not feel justified in taking the coolies any farther.[1]

These obstacles were happily overcome in 1930 by Professor Dainelli, who having ascended the Siachen and the Tarim Sher glacier on August 15th successfully crossed the pass into the Rimu with his caravan. He named the pass " *Colle Italia.*" He thus

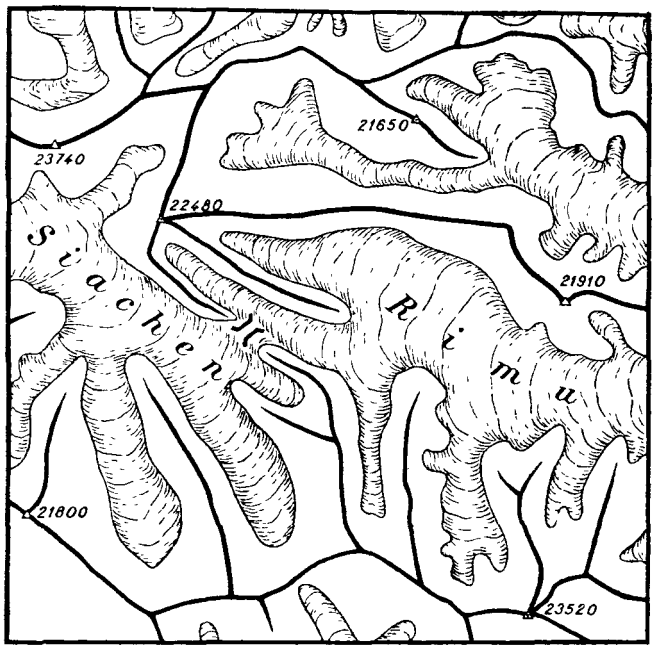


Dainelli's caravan on the " Italia Col," August 15, 1930.

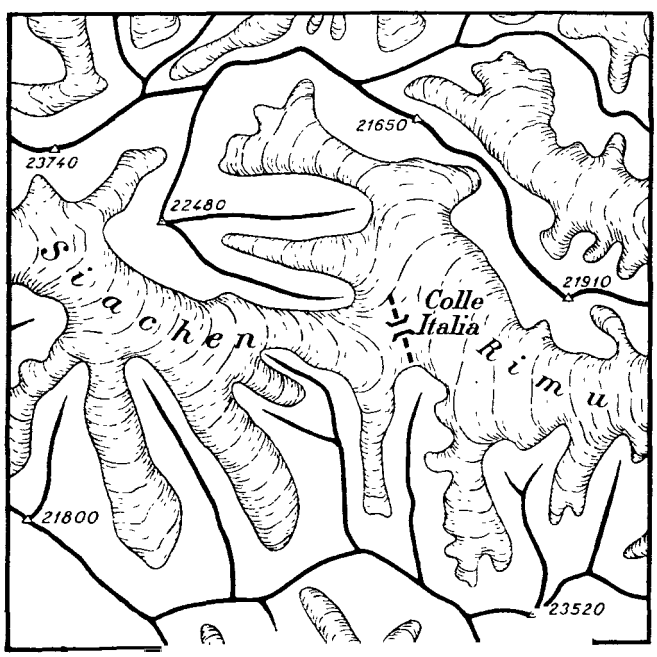
disposed of the objection raised by Mrs. Bullock Workman[2] that the existence of a pass leading from the upper circles of the Rimu to the Tarim Sher was not proved because neither her expedition nor ours was able actually to reach it ! Dainelli had the opportunity to make a closer investigation of the upper circus of the Rimu, the results of which are embodied in the small sketch here reproduced, compared with one drawn from the 1928 edition of sheet 52A of the Indian Survey map. In Dainelli's sketch the " Italia Pass " appears displaced eastwards and the two highest glacier-tributaries of the upper circus of the Rimu are made to flow into the Tarim Sher.

The northern and southern trunks of the Rimu lie in valleys exactly orientated

[1] F. B. and W. H. Workman, *Eastern Karakoram*, pp. 167 and 261. [2] See Workman, *op. cit.*, p. 169.



Sketch-map of the upper basins of the Rimu and Tarim Sher glaciers, scale 1″ = 4 miles, from the Indian Trigonometrical Survey map, Sheet 52E, 1928.



Sketch-map of the upper basins of the Rimu and Tarim Sher glaciers, Scale 1″ = 4 miles, from Dainelli's Survey, 1930.

from east to west. The first, which is flat and almost without crevasses, rises with a gradual and uniform slope from its confluence with the larger branch (17,700 feet), to a saddle 19,380 feet high, that leads to a steep valley beyond the watershed, enclosed within high walls and likewise filled up by a glacier. This glacier is a branch of the first considerable left-hand tributary of the upper Shaksgam valley, encountered by Major Mason in his expedition of 1926 (see *Report*, *op. cit.*, p. 26).

The southern glacier, rough and broken with séracs in its lower part, smooth and regular above, rises to a basin hardly 1,970 feet higher than the snout, which has characteristics quite different from the open plateau-like amphitheatres of the other two branches. It is deeply sunk between tremendous mountain walls that reach 22,000 and 24,400 feet in height, from which flow large affluents.

These peaks are at the northern extremity of the Nubra-Shayok range, between the Siachen and Rimu basins, which Mason considers to be a continuation of the Karakoram. Except for them, the ranges which enclose the valleys filled by the various branches of the Rimu are not very imposing, and the glaciers that descend from them do not seem in proportion to the vast size and volume of the main bodies, so that one wonders what feeds these enormous glacial masses. Perhaps the quantities of snow that fall directly into the valleys play an important part in their formation. We found the glacier covered with snow in going up the northern and central portions, from 18,300 feet upward; and even in July and August heavy falls had again covered the whole of the glacial basin with a thick layer.

The lack of moraines in the Rimu is remarkable as contrasted with the other larger glaciers of the Karakoram. Except the wide but short central moraine at the confluence of the terminal portions of the southern and central glaciers and of the marginal moraines along the right edge of the lower half of the main branch, which are all formed by a thin layer of small detritus with occasional boulders, there are in the whole extent of the Rimu only a few stretches of inconsiderable morainic fins. Even the tributaries descending from the ranges are without marginal moraines and end in bare fronts.

I should also refer to an attempt we made, frustrated by bad weather, to measure the movement of the glacier in its main branch. For this purpose, on July 15th, before leaving the second camp on the right edge of the Rimu, we placed across the glacier, immediately below its great curve, a number of large stones in a line from a point of reference on a stretch of dead marginal moraine. We intended to measure the absolute and relative displacement of the stones when we should visit the place again on our return. But when we came back again on August 4th, our marks were buried under the snowfall of the preceding weeks.[1]

[1] These brief observations, taken with such as I have made in my account of the exploration of the Rimu (Chapter XI) and with the panoramas and illustrations, will suffice to give an idea of the principal characteristics of the glacial basin. For a more detailed account, and especially with reference to the geological structure of the basin, see the volumes on geology and glaciology by Dainelli, *Relazioni Scientifiche*, Vol. III, and Vol. IV, Series II.

The Rimu glacier marks the eastern extremity of the great furrow which stretches almost unbroken south of and nearly parallel to the Karakoram range, and is filled from west to east by the Hispar, Biafo, Siachen (upper half), Tarim Sher and Rimu glaciers. This furrow appears to continue eastward in the Chipchap valley and that of the western source of the Kara-Kash; but beyond the Rimu there are no more large glaciers, and hardly any snowfall, although the region is almost as high. The line of demarcation between the two zones is so well defined that, seen on the map, it fills one with amazement. The chain that forms the left (eastern) side of the Rimu, although it is as high as the opposite (western) one, is quite free from glaciers and snow, except for a small cluster of glaciers that come down from the slopes of the twin peaks 20,810 and 20,910 feet, above the bifurcation of the northern branch of the Rimu.

This bifurcation is really the oddest feature of the glacier. The watershed ridge is broken, between two peaks 20,690 and 20,910 feet high, by a cleft over 3,000 feet deep, through which, towards the north-east, comes out a tongue or offshoot of the glacier, about two miles long and three-quarters of a mile broad; from the end of it issues the Yarkand. It is indeed rare to find a source common to two rivers [1]; up to the present this case of the Rimu is the only one known of a single glacier from which issue two important rivers that flow down on the two opposite slopes of one of the greatest watersheds of the world, that between India and Central Asia.

As I said above, the Yarkand valley had already been traversed by Hayward above Kufelang, up to within 15 miles of the offshoot of the northern branch of the Rimu, where the river rises. The exploration has now been completed by Wood and Spranger who also went up the valleys of the principal tributaries of the upper Yarkand.[2] They visited five tributary valleys to the right of the river[3] and three to the left, in the tract between its source and Kufelang, where the Yarkand joins the branch rising on the northern slopes of the Karakoram pass. The ones on the left are of greater interest because they penetrate into the region west of the Yarkand, which was entirely unexplored until Major Kenneth Mason's expedition in 1926.

Mason has cleared up the relation of these valleys with the eastern part of the Aghil range. He has established the fact that the saddle at the head of the highest of these western tributaries leads to the beginning of the Shaksgam valley. The next two tributaries that come out into the Yarkand valley 18 or 19 miles above Kufelang surround

[1] See Yule, *Cathay and the Way Thither*, Vol. III, p. 221, note, reference to legends of various rivers having a common source in one lake—all of these entirely fanciful.

[2] See Chapter XIII, also the article by Wood, "The Exploration of the Upper Yarkand Valley in 1914," *Geog. Jour.*, Vol. LIX, 1922, p. 375, and his Report published by the Trigonometrical Survey of India.

[3] The lowest, which is also the longest of these, was traversed and surveyed by Shib Lal, who on August 22nd, left Spranger at Baksum Bulak to cross directly to the upper Yarkand. The mountain system between the valley north of the Karakoram pass and the main course of the Yarkand river was crossed by the exploring caravans at three separate points.

the complicated massif whose centre is the plateau which Mason called Aghil Depsang. The third and lowest of these tributaries takes a long course westward and its head, formed by a large basin of glaciers flowing from a snowy chain, is almost an equal distance, about 30 miles, from the Yarkand valley and from the Karakoram range. This statement is interesting in connection with the traditions of an old cross-route that ran up the third western tributary of the Yarkand and was supposed to lead to the middle and lower Shayok valley. Hayward writes very explicitly:

"On the evening of our second day's journey from Kufelong we encamped in a wide part of the valley, opposite to the entrance of a deep narrow ravine effecting a junction from the south-west" (the third tributary to the Yarkand on the left). "At the head of this ravine a pass leads across the Karakoram range into the Nubra valley in Ladak, and to Chorbut, in Baltistan.[1] It is apparently at a very high elevation, probably not less than 19,000 feet above the sea, and is closed for nine months in the year by the snow. It is impracticable for anything but foot-travellers, and perhaps for yaks; and although not in use for many years" (this was written in 1869) "was formerly traversed by the Baltie carrying their own loads of merchandise into Yarkand. This pass appears also to have been used by the Kalmak Tartars in their successful invasions of Ladak and Tibet towards the close of the seventeenth century. From this point to the summit of the pass the distance is from 25 to 30 miles."[2]

This same information was brought back by Sir Douglas Forsyth and the members of the second mission to Kashgar in 1873.[3] It cannot be denied that the discovery which Spranger describes in the preceding chapter, of some objects deposited in a recess of rock in the third tributary of the Yarkand, a few miles above its end, tends to confirm the existence of this route.[4]

On the other hand, the conformation of the region and the formidable obstacles between Kufelang and the Nubra valley leave one perplexed and doubtful. Spranger has described the difficulties met with in the tributary valley of the Yarkand through which this short-cut between Baltistan and Central Asia must pass. For long distances they had to wade in the river-bed, which would only be possible during the autumn low water, when, presumably, the higher passes are closed by the snows. Wood's

[1] Chorbat, a village on the Shayok, 70 miles below its confluence with the Nubra.

[2] See Hayward's description in *Jour. Roy. Geog. Soc.*, Vol. XL, 1870, p. 59.

[3] Sir T. D. Forsyth (*Report of a Mission to Yarkund in 1873*; Calcutta, 1875, note to p. 248) says that at the top of the Nubra valley there existed a path across the Karakoram range by the Chorbat pass, reaching the Yarkand river at Kufelang. But according to the Indian map the Chorbat pass is in the range that divides the Indus from the Shayok, and connects Hanu and Khapalu. Sir Henry Trotter "On the Geographical Results of the Mission of Kashgar, under Sir T. Forsyth, in 1873–4," *Jour. Roy. Geog. Soc.*, Vol. XLVIII, 1878, p. 173) repeats this information, adding that the road, at one time much used by Balti traders, was rarely traversed in 1873, and was unsuitable for pack-animals. T. E. Gordon (*op. cit.*, p. 15) speaks of a route between the upper Yarkand and the Nubra, and even states that in 1873 it was the usual Balti route. Wood has pointed out to me a much older witness, Mir Izzut Oolah, an agent of Moorcroft, who speaks of the existence of this pass in 1812. His report is reprinted in *Jour. Roy. Asiatic. Soc.*, 1842.

[4] See pp. 391–2.

exploring party met with heavy snowfalls at the end of September, at a height of barely 14,800 feet. From observation points reached above the last camp in the valley, they convinced themselves that for more than 20 miles farther up there was no depression or cleft in the chains towards the south-west, in the direction of the Karakoram. Finally, between the supposed pass at the top of the valley and the chain of the Karakoram, there come in the Zug-Shaksgam and Shaksgam valleys (see Mason's map).

But there are traditions of other routes which were in use at some time across the glaciers of this part of the Karakoram; and the Workmans in their last expedition in 1912 to the Siachen glacier discovered interesting corroborative evidence. The Workmans reached the Siachen, as Longstaff had already done three years earlier, from Khapalu, by ascending the Saltoro valley, a tributary of the Shayok,[1] then the Bilaphond glacier to the pass from which another glacier, the Lolophond, goes down to join the Siachen. There is an old camping-place known as Ali Bransa on the morainic crest under the Bilaphond pass, with eight stone huts, long since abandoned. Opposite the confluence of the Lolophond glacier the large tributary Tarim Sher, 12 miles long, runs into the Siachen from the east. The name Tarim Sher (Turkestani for " oasis town ") actually refers to a promontory covered with grassy slopes that forms the southern angle at the confluence of the tributary with the Siachen, and upon this the Workmans found a circular wall about 4 yards in diameter, inside which were deposited large ibex horns with sections of skull attached. In the Saltoro valley they say that traders from Yarkand and Baltistan once used to meet in this oasis to exchange their goods.[2] Another very interesting discovery was the remains of two stone pyramids, certainly piled up by the hand of man, on a spur at the base of a large tributary of the upper circle of the Siachen, which descends from a saddle on the crest of the main Karakoram watershed, to which Mrs. Workman gave the name Turkestan-la. She thought it to be the pass that Colonel Sir Francis Younghusband tried to reach in 1889 from the north by climbing the Urdok glacier, which descends from it into the Shaksgam valley.[3] The pass is 20,860 feet high, and Mrs. Workman climbed to it without too great difficulty from the foot of the glacier. The descent towards the Shaksgam valley is, at any rate for part of the way, steep and more difficult.

All these traces seem to be distributed like sign-posts on the theoretically possible routes through this region. Having reached Ali Bransa near Bilaphond-la, from Khapalu, a way might lead down the Siachen glacier to Nubra after crossing 45 miles of glaciers. Mrs. Workman argues, against the probability of this having been used, the difficulty of traversing the lower half of the Siachen, and the impossibility of fording the Nubra river during the whole of the hot season, from May till mid-September.[4]

[1] Also visited by Dainelli in December, 1913.

[2] F. B. and W. H. Workman, *op. cit.*, p. 160.

[3] But see H.R.H. the Duke of Spoleto in *Geog. Jour.*, Vol. LXXV, pp. 390 and 400.

[4] Workman, *op. cit.*, p. 221.

A second cross-route would join Khapalu (lower Shayok) with Yapchan near the source of the Shayok itself, by Ali Bransa, the Siachen, the Tarim Sher and the Rimu, passing over more than 60 miles of glaciers. In the present condition of the upper basins of the Tarim Sher and the Rimu, possible only for roped caravans with expert knowledge of glaciers, it is safe to exclude the possibility of parties of natives going that way.

Finally, going up the Siachen to the eastern saddle at its head, Turkestan-la, one could reach the Shaksgam valley, and go thence to Yarkand either by the Aghil pass or by a pass at the head of the second or third western tributary explored by Wood and Spranger and by Mason in 1926. There are 40 miles of glaciers to cover in order to reach Turkestan-la, and at least 12 miles more to descend to the Shaksgam. Mrs. Workman, here too, not unreasonably maintains that it is impossible for this ever to have been a route used by the natives on either side of the Karakoram.[1]

Thus we are faced with complete contradiction between two sets of conclusions: one drawn from direct observation of the places themselves, the other from evidence of traces left by travellers in past times: to which must be added certain traditions too detailed and consistent to be brushed aside entirely.

In 1842 Vigne had heard reports of the existence of a route to Yarkand by Ali Bransa and had made an attempt, foiled by bad weather, to reach Bilaphond-la.[2] Neve heard the inhabitants of Nubra speak of raids by the Kunjuts (people of Hunza and Nagar) who got into their valley by a pass at the head of the Siachen glacier: and they also knew of a pass between the Siachen and the Rimu.[3]

Longstaff was told by a Khapalu notability, Ali Sher Khan, that there were two roads beyond the Bilaphond glacier, one leading to Yarkand, the other to Nubra. And two Balti porters, pointing out to him the Siachen, under the name of Tarim, from the top of the Bilaphond-la, added that by the Siachen one reached Chang Thang, "the northern plains," in other words, the plateaux on this or that side the Karakoram.[4]

It must also be observed that the very fact that the glaciers, passes and bivouacs possess native names, is in itself a proof that there was a time when they were frequented by travellers.

It seems to me, therefore, that we must accept the traditions as true; but that they must refer to a time in which the conditions of the glaciers and passes were very different from the present ones, and such as to render possible the passage of parties of natives laden with merchandise. We know that such changes have occurred in other glaciers

[1] Workman, *op. cit.*, pp. 178, 188 and 220 note.

[2] Vigne, *op. cit.*, Vol. II, pp. 382–7. The supposed pass leading to Turkestan is also indicated in the map which accompanies the volumes.

[3] A. Neve, *Thirty Years in Kashmir*, pp. 254, 259.

[4] Reported by Neve, who was with Longstaff on the Bilafond-la (*op. cit.*, p. 292). It should be observed that Vigne (*op. cit.*, Vol. II, p. 364) gives the name of Chang Thung to the plateaux south-east of the Karakoram pass, where the Kara-Kash rises.

of the Karakoram, for instance in those of the two Mustagh passes, which are to-day impracticable for native caravans, though there are undisputed historical proofs that up to about a century ago they were frequented routes of communication between Baltistan and Turkestan.[1]

[1] See my *Karakoram*, p. 245. Wood has summed up the question of the old routes of communication between the countries north and south of the Karakoram ranges, in an appendix to his account. See also Dainelli, in *Relazioni Scientifiche*, Series II, Vol. VIII, p. 190.

CHAPTER XV

THE KARAKORAM, SUGET AND KOKART PASSES. THE RASKAM DARIA OR UPPER YARKAND VALLEY [1]

The expedition reunites at the Depsang base camp—First news of the European war—Alessio, Antilli and Alessandri return to Italy—The expedition leaves Depsang—The Karakoram pass—A further division of the expedition—The Suget Dawan—Suget Karaul—Departure of Dainelli and Marinelli—Among the Kirghiz—The Kokart Dawan—Kirghiz Jangal and the Kanjut raiders—The valley of the Raskam Daria—Bazar Dara—Surkowat and the Aghil range—The Raskam unfordable: we abandon the exploration of the Shaksgam.

ON August 13th, as we have seen, the party which had undertaken the exploration of the Rimu glacier returned to the base camp on the Depsang plateau, whither the caravans of Dainelli and Marinelli and of Wood and Spranger had preceded it by some days. Once more the expedition was reunited, after many weeks of separate work.

We at once prepared to leave the Depsang and cross the ranges between us and Central Asia. Rasul Galwan had left a fortnight before, to collect a transport caravan among the Kirghiz beyond the Karakoram; we looked for his return about the 20th. In the meantime, we set about organizing our new programme, without a care in the world, save some anxiety caused by the interruption in our mails, which had lasted for more than a month.

The bad weather which had proved such an obstacle in the mountains prevailed

[1] The illustrations of this and the succeeding chapters are from negatives taken by Abetti.

that summer over a very large area; and caravans had had difficulty in using the Karakoram route. The swollen Indus had carried away the bridges near Leh; the gorges between Murgo and the Shayok valley had been impracticable for some time on account of the high water, and a good part of the way in the Shayok valley, near Yurgolok, was blocked by landslides, and had become impracticable even on foot. Our post-horses had been obliged to turn back to Sassir, and get to Leh by the old Nubra route and the Kardong pass.

At last, on the afternoon of August 16th, at tea-time, there arrived all together four horses with five European mails, and our tent was suddenly transformed into a miniature post office, while we sorted the letters and newspapers. Wood and I opened almost simultaneously, he a telegram sent to Leh by the Indian Survey office, and I a very brief letter from Captain Gabriel, the Joint Commissioner at Leh. The words were almost identical: "Austria has declared war on Serbia, Russia on Austria, Germany on France and Russia; England and Italy not yet involved." Both messages had been sent on the 4th of August, a few hours before the expiration of the English ultimatum. We were all stunned for some minutes. The papers, some weeks old, gave but scanty information as to the events leading up to this catastrophe.

A host of conflicting thoughts succeeded to our first bewilderment. With Europe in such confusion, it seemed impossible that Italy and England should not have begun to mobilize their armies and navies. And the uncertainty was the more agonizing for us Italians, because, being completely ignorant of the decisive causes of the struggle, we had to face the possibility of all ways of return being cut off. Alessio and Antilli, who were officers in the Navy and the Army, felt that they ought to return to their country at once. Alessandri, who was a reserve officer, agreed with them; in any case, with the completion of the Depsang station, his task was accomplished. Wood, in accordance with the instructions in the telegram from the Survey office, agreed to carry on with us, and to take Alessio's place as second-in-command of the expedition.[1]

The rest of the party were not bound by any special military obligation and agreed to go on with the undertaking despite everything, in the hope of being able to carry out the whole programme.

In the few remaining hours of daylight, I arranged for the conveyance to Leh of those who were leaving us, together with the four horses which had been used for postal service during these months, the lambardar of Leh, and 35 porters. Abetti took over Antilli's photographic equipment, and added to his other burdens that of illustrating

[1] I desire to express my lively sense of gratitude to the Government of India, which despite the new and heavy responsibilities involved in the state of war, desired to continue its co-operation with the expedition up to the end; we continued to profit by the services of Wood, Jamna Prasad and Shib Lal; and the wireless time-signals continued to be sent us from Lahore and were registered at the same time at the office at Dehra Dun, with the accompanying astronomical observations.

the districts we traversed and the incidents of the expedition. Ginori agreed to assist in the astronomical observations for the geophysical stations.

The next morning, August 17th, we took leave of Alessio, Antilli, and Alessandri. We said little but felt much; the immensity of the cataclysm weighed upon us, putting all personal considerations out of our minds. We gazed long after the little caravan moving southwards across the plateau, until it dropped slowly from sight.[1] Henceforth everything was changed. Left without any news for months together, we chafed at the thought of what might be happening to our countries, like a man who knows a dear friend is at grips with danger, but who cannot get to him or receive any news.

The next day Dainelli and Marinelli left the camp in their turn; they were to precede us across the Karakoram collecting fossils, stones and plants and completing their geological survey. We saw them from time to time on the way, but they went on ahead of us as far as Suget Karaul, halting and camping independently. At the moment of departure the 25 porters chosen for their caravan refused to start. Their companions' departure for Leh on the previous day had made them homesick, and the 18 men from Kargil who had been with us for six months seemed particularly set on returning. The others contented themselves with demanding a larger wage. With a little patience we succeeded in persuading them all to remain in our service under reasonable conditions. Then we went on with the work of dismantling the station and packing the instruments for the new journey.

We continued to pack uninterruptedly during the whole of the 19th, while the camels, horses and donkeys for our caravan arrived by small groups in charge of Kirghiz drivers, and assembled on the other bank of the little river, opposite the camp. They were preceded by Rasul Galwan, with the son of the Kirghiz *beg* from Shahidulla.

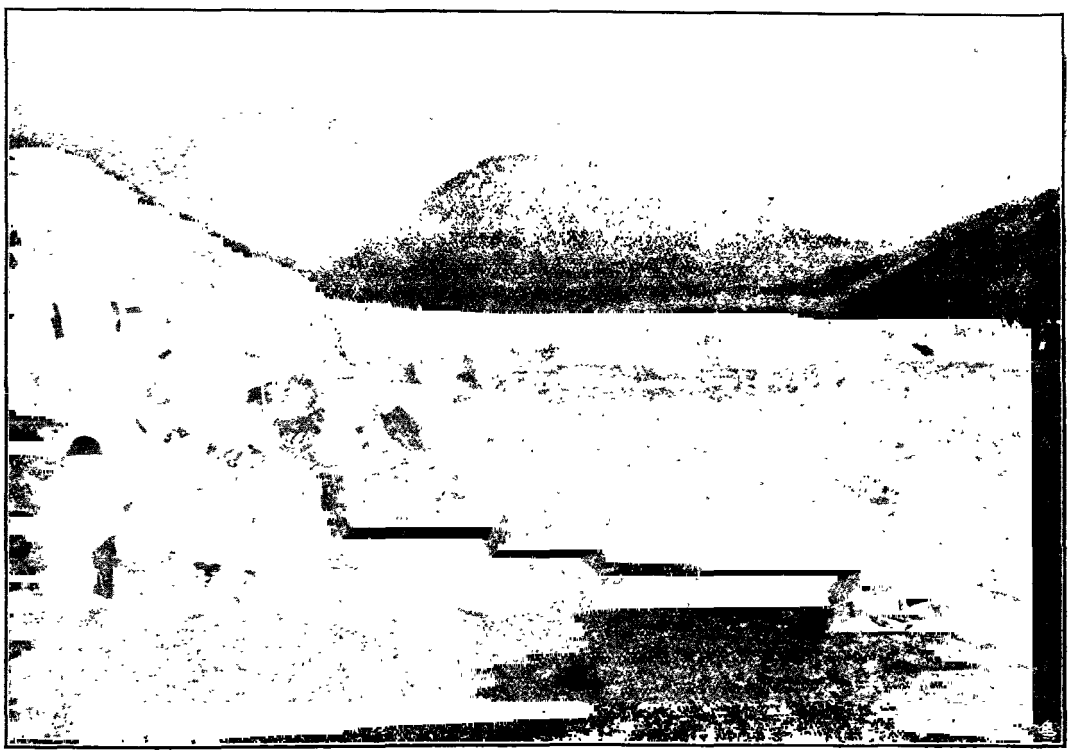
When we took stock of the stores needed for the rest of the campaign, we found that, with our diminished number, we had several superfluous cases of provisions. Some of these we dispatched at once to Leh together with 16 cases containing stones and fossils, the rest were piled up for Rasul Galwan to take with him later on, on his return from Chinese Turkestan, at the end of his term of service. It seemed strange to leave these supplies by the roadside with so much coming and going of caravans, but it was really quite safe. It is traditional to respect baggage left by the way, and merchants who have lost a number of horses and find themselves unable to transport their goods, generally leave them on the spot without further thought, feeling sure

[1] Our companions proceeded by forced marches, hardly taking time to rest at night, urging on the coolies and availing themselves of every means of transport which they could find on the way. They went by the Sassir pass, the Nubra valley and the Kardong-la, and succeeded in arriving at Leh in nine days, and Srinagar in another ten. On September 8th they were at Bombay—only 23 days after leaving the Depsang—and sailed on the 12th to return to Italy.

that they will find them there when they pass that way another time with ampler means of transport.[1]

We ended the day by writing letters to our families and friends, the last that we should be able to dispatch to Europe by way of Leh. All was in readiness for the last phase of our campaign.

On the morning of August 20th we set out, turning our backs on the bare and desolate tableland. The only remaining trace of our long sojourn and our work was



Group of Kirghiz in camp.

a large pyramid of stones which we had erected on the spot where we had carried out the measurements of gravity.

We had a typical Asiatic caravan, quite different in appearance from our earlier ones. All the caravan-men were Kirghiz, a fine race, tall, lithe and robust, much better balanced and proportioned than the Ladakis. Most of them are Mongolian in type and features, but there are some of different origin, with Indo-Caucasian traits, well-trimmed

[1] Various travellers bear witness to this fact: among them C. M. Enriquez (*op. cit.*, p. 197), G. Henderson and A. O. Hume (*op. cit.*, p. 112).

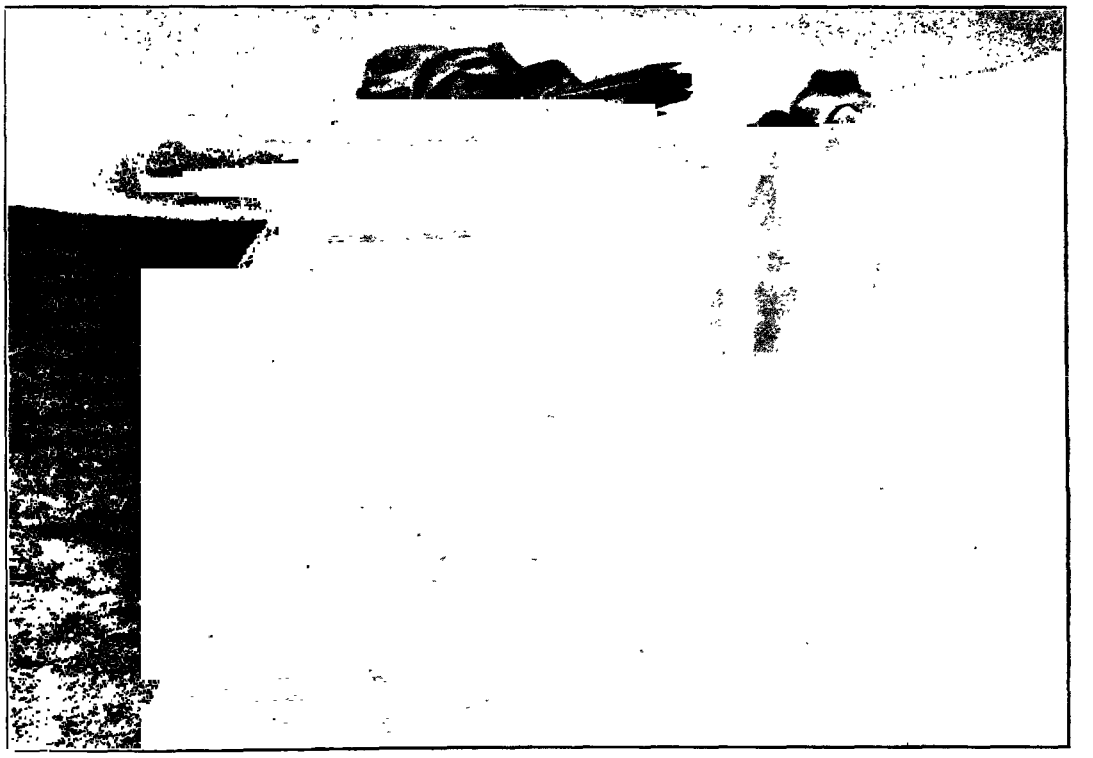
beards and moustaches, sometimes fair or even ruddy hair and rosy complexions. They wear boots of soft Yarkand leather, and long quilted cotton robes with coloured stripes in which red predominates, and the sleeves come down well below the hand. The garment is fastened at the waist by a belt, from which hang, attached by chains, a sheath-knife, a flint, a horn for gunpowder, and a bullet-mould. From the shoulder hangs a long gun with a butt of the Arab pattern and a hinged prop, on which the barrel rests when they aim while lying on the ground. The head-gear varies; it is frequently cone-shaped, with a turned-up brim and covered with fine embroidery in red thread, also lined with red; often it has a fur border. There are also felt caps, and hunting-caps with a wide turned-up brim also embroidered, and ending in a double point in front. Others again are a mixture of the conical and cylindrical, made of silk or cotton, entirely lined with fur.

Nomads by race and habit, the Kirghiz are excellent caravan-men, understanding perfectly the handling of pack-animals and the best ways to load and unload. They are used to long stages, when they keep the caravan well together, and do not indulge in endless disputes and chatter, like the Baltis and Ladakis. I found them well trained and willing, though they are a prouder and more independent people than those among whom we had been up till now. They brought us 40 big, strong Yarkand horses, whose pack-saddles rested on quilted cloth with many folds of thick felt beneath; likewise 60 very fine camels which gave our caravan a thoroughly Oriental look. The Bactrian or Asiatic camel has two humps, and is smaller and more graceful than the Indian or African one. The neck, face and shoulders are covered with thick, soft wool, and they may be brown, tawny or pale coffee colour.[1] Our camels were sound, well groomed and without sores; they were guided by a simple bridle, without the cruel wooden nail fixed across the septum of the nose which is used in the trans-Caspian district and in Russian Turkestan. They walk in long lines, each attached by the bridle to the saddle of the one before it, with a kind of solemn gravity, a measured and regular tread, marked by the rhythmic sound of the big copper or iron bell which hangs from the neck. A Kirghiz mounted on a donkey rides at the head of each group. At the halting-place, the camels must kneel to be unloaded; and in the thousands of years spent as domestic animals they do not seem to have acquired the necessary flexibility. Painfully and reluctantly they bend their joints, with awkward jerks like a mechanical toy, protesting the while with indescribable cries which vary from a bleat to a bray and then to a roar, now harsh and now pathetic. When unloaded, they are kept squatting in long lines, their bridles tied short to metal ropes stretched between two staves fixed in the ground; there they chew and ruminate the scanty *burtze* and dry shoots placed

[1] Marco Polo speaks of camels with very fine white hair in Southern Mongolia. See Yule's *Marco Polo*, 2nd edit., Vol. I, p. 272 and note on p. 274. The Schlagintweits were the first to bring a pair of Bactrian camels to India, across the mountain ranges, and thence into Europe, and to the Berlin Zoological Gardens (*op. cit.*, Vol. IV, p. 198).

before them. The last touch to the scene was given by our little flock of sheep and goats, relic of that earlier one which had followed us from Leh onwards, with their two Tibetan shepherds.

In about an hour after leaving the Depsang camp, we reached the northern edge of the plateau, on the brim of an open, gently sloping little valley, watered by a small stream but with no signs of vegetation. We went straight on towards the Karakoram. It was bare of snow and ice, with only slightly prominent peaks, and did not



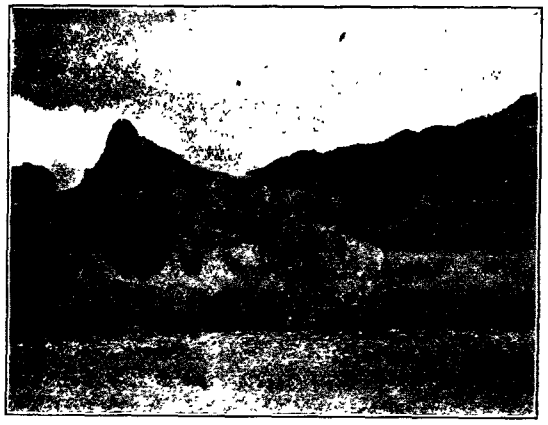
Bactrian camel.

look like a transverse range of mountains, but rather like a series of parallel ridges, running from north-west to south-east, irregularly connected by saddles and masses of brown and yellowish rocks, with here and there great red patches.

In another hour we got down to the level of the wide Chipchap valley (16,410 feet), which a little lower narrows into gorges. Here, not distinguishable by any special mark, is a halting-place called Daulat Beg-uldi, or " (the place where) died the Lord of the Land." The reference is to Sultan Said, who in 1531 invaded Ladak and Baltistan with a following of 5,000 men, and died here, it is said from mountain

sickness, on his return two years later.[1] The old route, which followed the narrows of the Shayok from Sassir, before it was shut off by the Kumdan glaciers, here joins the modern road which crosses the Depsang plateau.

The Chipchap is here a small stream, and skirts the foot of a terrace which stretches on the right side of the valley. We climbed on to it, and soon found ourselves in the valley leading to the pass, which is open, and mounts between bare slopes at a slight gradient. We passed the mouths of two tributaries, which come down almost opposite each other, and another camping-place called Pulo [2] with the ruined remains of three stone cabins, and continued to ascend for another hour, as far as the halt Chajos Jilgha, marked by a layer of bones and some carcases with the flesh desiccated by the cold dry air. We pitched our tents at one end of the little plain, where it was not quite so thick with skeletons. We had covered more than 14 miles.



[*Phot. Spranger.*

Pulo.

The valley continued to mount very gently, gradually inclining towards the west. The way wound along a broad terrace at the foot of high cliffs; the other side, to the right of the valley, was formed by low, not very steep buttresses. Barely 4 miles from Chajos Jilgha we reached the opening of a gorge, which cuts the left (northern) slope. This valley led us directly to the pass, after a short ascent which we climbed by a zig-zag path. One could see the principal valley which we had just left continuing for a short distance at the same width, as far as a wide saddle, and beyond it a distant range laden with glaciers, lying beyond the Yarkand. It was by this saddle that Wood and Spranger first penetrated into the upper basin of the Yarkand.

Two hours and a half after leaving camp, we were on the Karakoram pass, a broad saddle, flat for some hundred yards on the top, and flanked by moderate heights. The absence of snow and glaciers, the height of the whole region to north and south of the pass, the moderate slopes of the mountain-sides, do not give an impression of high mountains, and did not at all suggest the great height we had reached, 18,300 feet above sea-level.

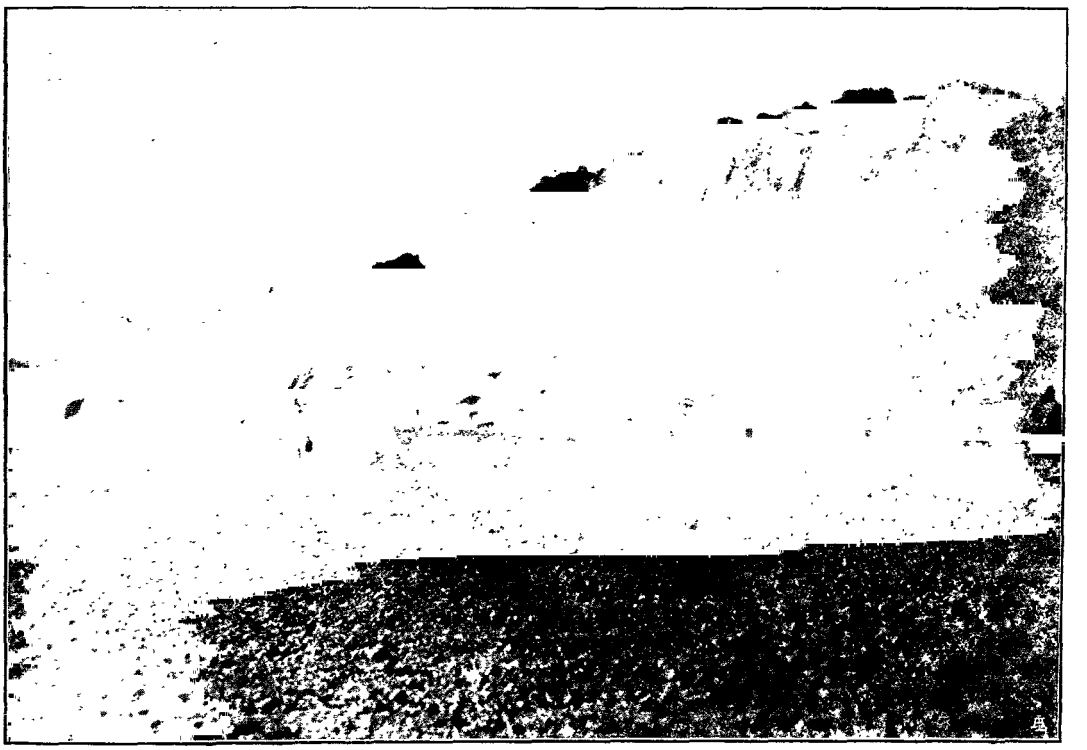
At the top of the pass is a broken and tumble-down stone pyramid, one stone bearing an inscription to the memory of Dalgleish, a merchant who traded between Yarkand

[1] See p. 44.

[2] Probably from the Tibetan pu-lu, a rough shelter of stones or skins.

and Leh, and who was murdered here by an Afghan in 1888.[1] A little farther on, to the north of the pass, is one of the usual heaps of votive stones which the Ladakis place at the summit of mountain passes.

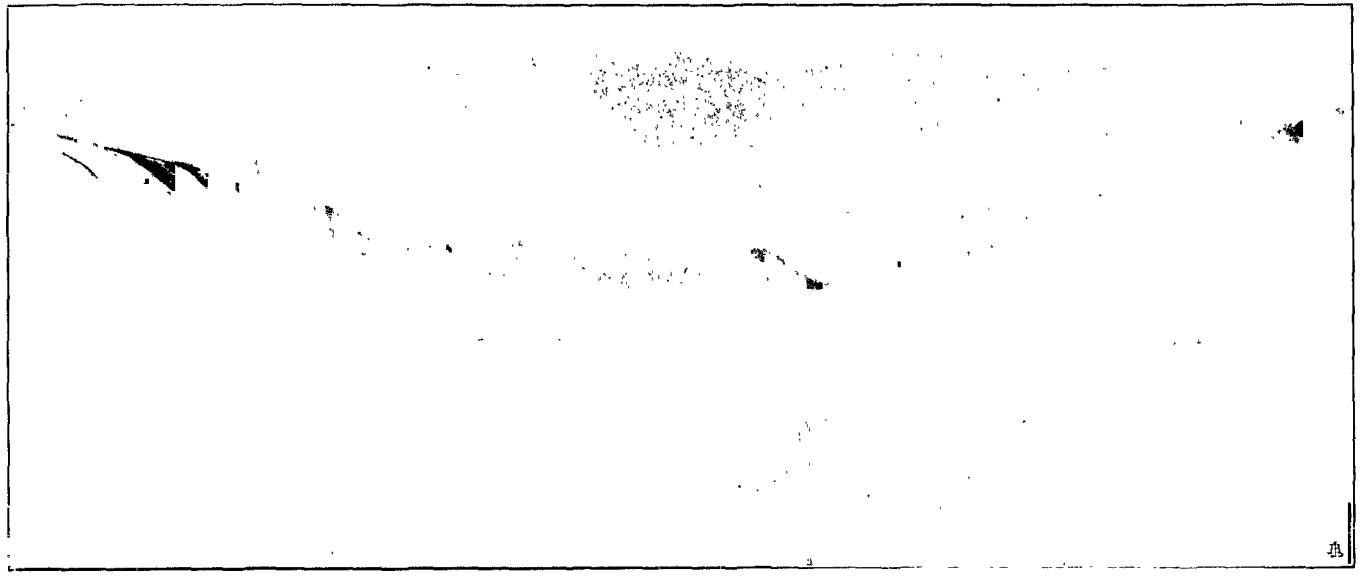
"Kara Korum,"[2] which means "black stones" or "black gravel," has been from time immemorial the name of the pass crossed by the principal trade route between



Camp at Chajos Jilgha on the way to the Karakoram.

[1] The monument was set up by Captain A. Bower in 1889. See his "A Trip to Turkistan," *Geog. Jour.*, Vol. v, 1895, p. 240, where he gives an interesting account of the hunt for the murderer, who was finally tracked down and arrested in Samarkand, where he committed suicide in prison.

[2] Vigne, in 1842, spelled the name Kara-Kurum; T. H. Thomson, the first European to reach the pass, in 1848, first called it Karakorum (*Jour. Roy. Geog. Soc.*, Vol. XIX, 1849, pp. 25, 28, 29); but in his book published four years later he adopted the form Karakoram. Cunningham in 1854 and Johnson in 1856 do the same. But Shaw in 1871 returns to the old form (Karakoorum) as also Captain Trotter of the second Forsyth mission, who spells it Karakorum. Since then the regular English form, in maps and publications, has been Karakoram. The matter has a certain importance, because other passes north of the Karakoram, in the Kuen Lun range and its ramifications, have analogous names, derived from the form or the colour of the stones, such as Takta-Korum and Ak-Korum; in fact there is a whole group of names ending in Korum.



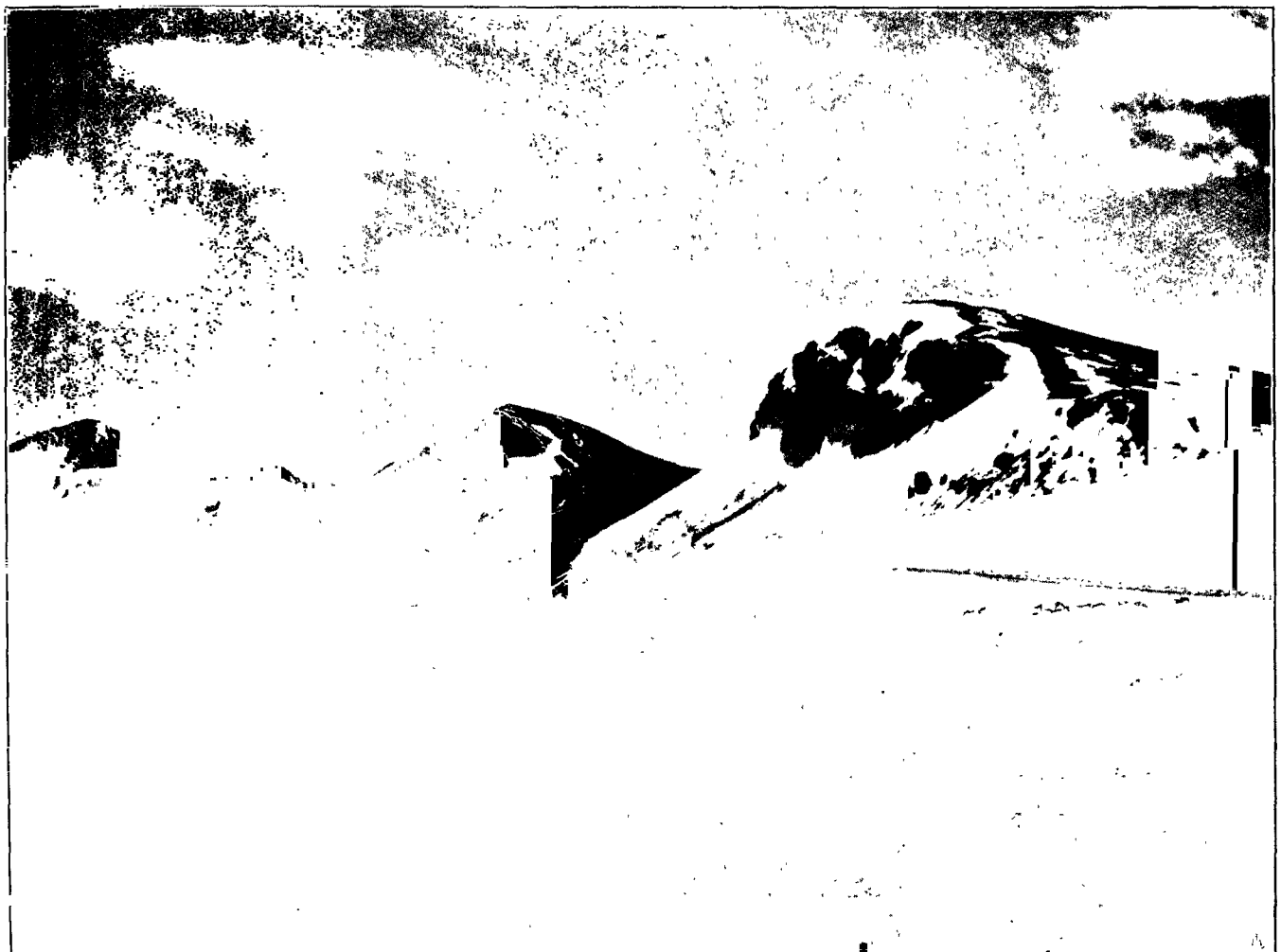
Climbing up to the Karakoram; on the southern side, a little below the pass.

Central Asia and India, via Ladak. It was the brothers Schlagintweit[1] who suggested that the name be extended to embrace the whole watershed range which stretches westward as far as the Hindu Kush (north of Hunza-Nagar) and on the other side runs rather vaguely south-east, dividing the basin where the Kara-Kash rises from the basin of the Chipchap, and the Shayok and the lake system of the Pangkong from the plateaux of Tibet merging into Sven Hedin's Trans-Himalaya.[2]

To the north of the pass a short steep slope like the one we had just climbed leads down with a gentle gradient to the open valley, through which runs the tributary that later joins the Yarkand at Kufelang, among yellow hills speckled here and there with red, which seem to belie the name of the pass. At one point the valley is almost completely blocked by a promontory projecting on the left, and by a great landslide which has fallen from the right. Beyond this narrow passage there is a wide circular basin, with a gravel bottom, on one side of which were a few short stone walls, such as the Baltis erect for a shelter against the wind. All around were heaps of bones. The place is called Balti Bransa. Several valleys converge in the basin, and among the western mountains there is a low saddle, by which Wood and Spranger and afterwards Dainelli and Marinelli reached this point from the upper basin of the Yarkand. After a short rest we continued across the basin, meeting troops of antelopes that seemed very little alarmed by our presence. Then the valley narrowed once more and we skirted the foot of a long tract of fiery-red hills and finally stopped at the halting-place of Baksum Bulak or Tashnatube. We had walked more than nine hours, covering 20 miles, always at an altitude of over 16,500 feet. We were plagued from the pass downwards by a strong south wind.

[1] H. von Schlagintweit, *op. cit.*, Vol. II, p. 6; Vol. III, pp. 2–4.

[2] The pass is actually situated on a range north of the Karakoram, which may be considered the eastern prolongation of the Aghil range. This is the considered opinion of Wood, derived from his survey of the Depsang and the adjoining territory. Indeed, as early as 1908 Sir Sidney Burrard, in his *Geography and Geology of the Himalayan Mountains* (with H. H. Hayden) states (p. 175 note): "This pass is not on the main Karakoram range but on a parallel range behind" (to the north of it). Recently, following on Major Mason's proposal of a new classification of the Karakoram, Aghil and Nubra-Shayok ranges (see Chapter VII of his report on the exploration of the Shaksgam and Aghil) the discussion on the alignment and nomenclature of the ranges has been renewed. See the articles by Sir Sidney Burrard, Major Mason, T. G. Longstaff, and C. Visser, in *Geog. Jour.*, LXXIV, 1929, pp. 274 *sqq.*; LXXV, 1930, p. 35, and LXXVI, pp. 138, 143, 148; also a paper by Sir Sidney Burrard in *Proc. Roy. Soc. A*, Vol. CXXVII, 1930, p. 704.—It is not possible to go into particulars here; or to discuss the arguments in favour of this or that alignment. The problem is rendered particularly difficult owing to the lack of correspondence between orography and hydrography in the great systems of mountain ranges interposed between India and Central Asia that makes it impossible to group them in a way satisfying both to morphology and hydrography. I have naturally given the main consideration to the latter, strictly adhering to the geographical aim of the expedition, which was the exploration and survey of this portion of the watershed between India and Central Asia. Our problem was entirely one of hydrography.

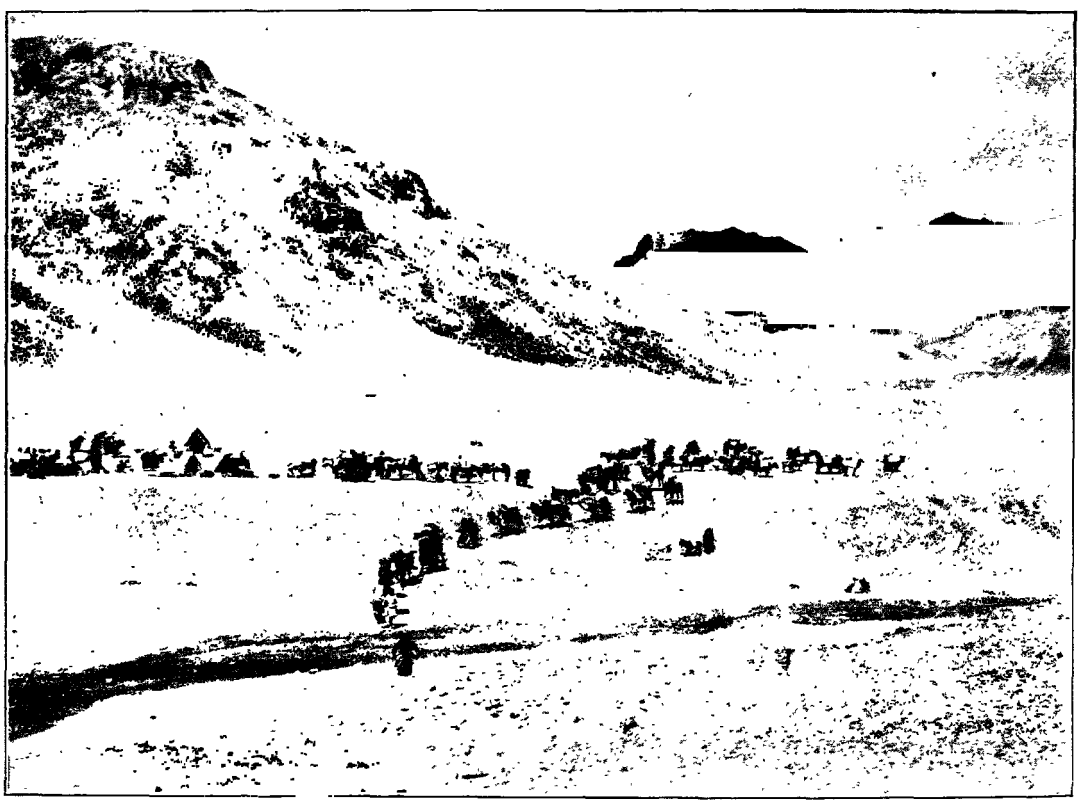


On the Karakoram pass, looking south-east.

On the Karakoram pass, looking west.

The camp was pitched on a high terrace to the right of the river, which described a wide curve at our feet. A great snowy range seemed to shut in the valley towards the north, the range of the Suget pass, for which we were bound, a branch of the great Kuen Lun chain.

Here our party again broke up. Spranger, with Petigax, would follow the valley to its meeting with the Yarkand at Kufelang. Both surveyors were to go with them;



The caravan leaving Baksum-Bulak.

Jamna Prasad with a transport caravan with provisions for our use in the excursion towards the Shaksgam was to wait for us in the Yarkand valley, three stages below Kufelang, and Shib Lal was to cross by another way the mountains which separated us from the upper Yarkand, in order to complete their survey. Wood stayed with us, to help in the work at the geophysical station, which we were to make at Suget.

Dividing up the baggage made us late in starting, and we made a short stage of barely $7\frac{1}{2}$ miles to Darwaz Sarikot, situated in a side valley not far from the main one. The latter became still more level, opening out almost like a plateau. The valley is

superficially hollowed out of a large undulating basin of which only a few isolated islets stand out, with the river flowing round them. From time to time the valley is cut transversely by an undulation like a dyke, through which the waters have cut a narrow passage. The most shelving parts are covered with white efflorescence, and here and there with mud from the standing water. Low mountains of uniform design form a cornice, with a few small hanging glaciers on the northerly slopes. The landscape is of vast proportions and gave us a livelier sense of unlimited space than anything we had yet seen, added to an indescribable desolation and sadness, partly due, no doubt, to the leaden skies and dull atmosphere.

The next day, August 23rd, we made a long march of 19 miles and reached the foot of Suget Dawan.[1] At first we continued to descend the valley, keeping high up on its right flank, to a point where a big stream on that side joins the river as it bends north-westward in the direction of Kufelang. We did not pass through Ak-Tagh, but about a mile east of it.

Ak-Tagh (white ridge or hill) is well known as the place where the road forks; one branch used for choice by caravans in the late autumn and winter, follows the valley as far as Kufelang, whence it descends the Yarkand for five stages to Kulan Uldi or Chirak Saldi, the starting-places of two routes which cross the Kuen Lun chain, by passes much lower than the Karakoram, and reach the Tiznaf valley; the other branch, which we took, leads straight to the Suget pass and the valley of the Kara-Kash.

After crossing the stream I have just mentioned, we traversed an undulating area resembling sandhills, and so came down into the perfectly dry bottom of another tributary valley, which led us up a gentle slope among formless yellow hills to the foot of the pass, where we pitched the camp in a place called Chibra, at a crossing of valleys.

Just above our camp the valley divided into three small ones; we took the one to the left, which after an hour and a half of not too steep climbing, led us to the broad saddle of Suget Dawan, 17,610 feet high. The pass is on a mountain range, a branch of the Kuen Lun, dividing the Yarkand valley from the Kara-Kash. Hayward gave the name Ak-Tagh to the range. The view to the south, over the Karakoram and the region we had just traversed, was flat and quite uninteresting; but to the north one sees part of the Kuen Lun range, with several glaciers.

The descent north of the pass is much steeper than the ascent from the south. A stony little valley led us to a larger one, a good deal blocked up with huge glacial deposits, where we found ourselves all at once among granites. Little by little, as we descended, signs of verdure sprang up among the stones, then bushes of dwarf willow, which give the name to the whole region (Suget means willow). There were no more skeletons; a flock of pigeons and some gaily-coloured little birds made us feel as though we were leaving the desert. The gorge ends with a great stony slope, by which we descended to the wide plain of the Kara-Kash.

[1] *Dawan* is the Turkish word for a mountain pass, corresponding to the Tibetan *la*.

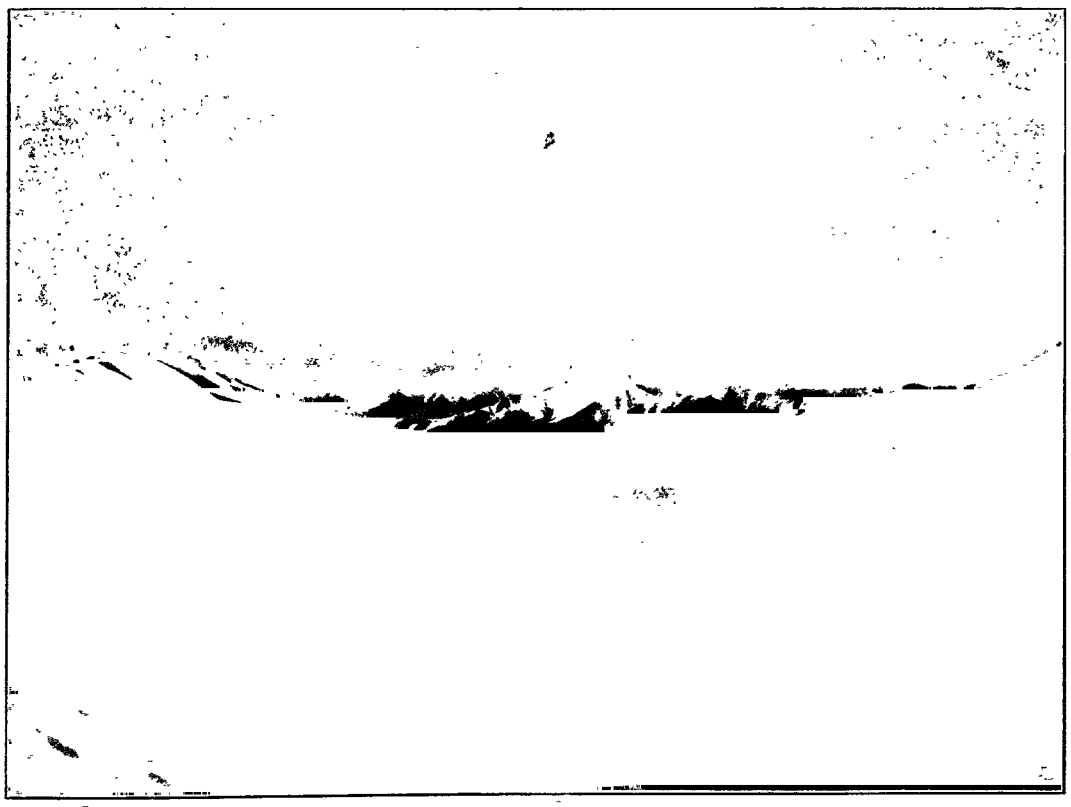
In the centre of the valley, on the left bank, but at a distance from the river, is Suget Karaul (the fort of Suget), a massive square of masonry, with thick battlemented walls some 16 feet high, made of pebbles cemented with mud. You enter by a large open gate in the west wall, facing down the valley. In the inner courtyard two rows of little rooms for the native caravans are built against the northern and southern walls of the fort; on the eastern side there are a few decent rooms, the quarters of the Chinese

Camp at Chibra, at the foot of the Suget Dawan.

customs official. He was a man of uncertain age, with thin moustache and pointed beard, clothed in Chinese dress but with a European soft hat on his head. He received us effusively with much emphatic talk which of course we did not understand. With him was the *beg* or head of the Kirghiz of the district, to which the men of our caravan belonged.

We had come down nearly 5,400 feet from the pass, and were 12,240 feet above sea-level. We set up our tents in the courtyard and mounted the instruments for the station, making use, as usual, of several little rooms in the *serai* for the observations which had to be made under cover.

Outside the fort the valley is a great stony waste, except for two thin strips of vegetation along the river; it rises at a gentle slope to the east, and through it passes the so-called route of the plateaux between Leh and Yarkand by the Aksai-Chin and Lingzi-Thang. At no great distance above Suget are the quarries whence for centuries blocks of jade have been taken, to be carved by Chinese artists into articles of great beauty



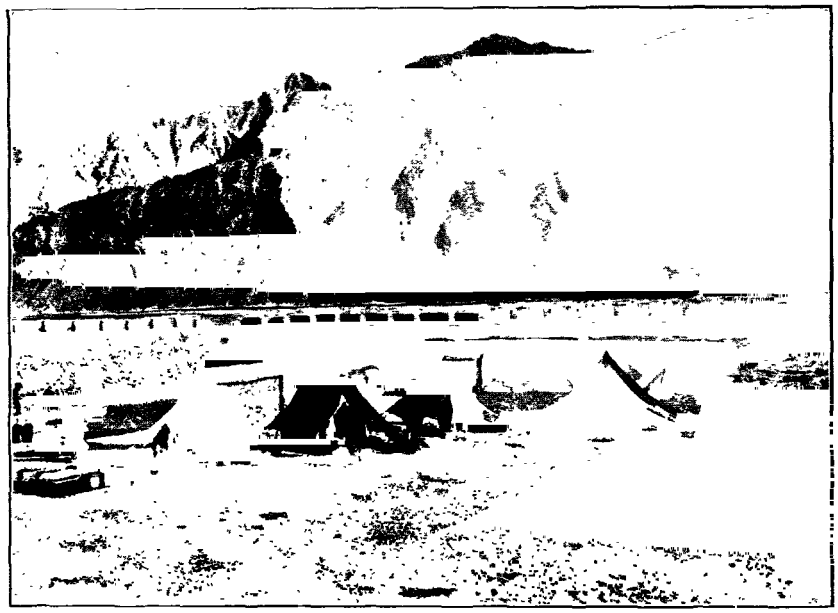
Looking north from the Suget Dawan.

and value. The waters of the Kara-Kash also roll down occasional lumps of the precious stone.[1] Below Suget Karaul the Kara-Kash turns northward between narrow

[1] That Chinese jade came from the valley of the Kara-Kash was known even before Europeans had penetrated thither. William Moorcroft, writing at Leh in 1822, says: "The Dereas Kara, or Black River contains in its bed pebbles, called in Toorkee *Yushm*: such stones are nearly transparent, perfectly white and free from specks or stains, are highly esteemed in China, and Chinese guards are constantly stationed along the banks of the river to prevent private individuals procuring any, as these jaspers, or agates, formerly an object of commerce, are now reserved for the use of the Emperor alone." (See Notice on Khoten, from Papers of the late Mr. William Moorcroft; *Jour. Roy. Geog. Soc.*, Vol. 1,

mountains, where only a few miles away is the fort of Shahidulla, built by the *waẓir* of Ladak for the government of Kashmir in 1864,[1] and occupied for two years by troops of the Maharajah during an insurrection of the people of Turkestan against the Chinese. Johnson found the garrison there in 1865; in 1868 Shaw and Hayward found it garrisoned by Turkestan troops.

None of our predecessors mention the fort of Suget (which is not even marked



Suget Karaul.

on the French map Asie 1,000,000, F° 40° N, 78° E, 1901). In 1857, when Adolf von Schlagintweit passed this way, it was a simple camping-place, and in the accounts

1831, p. 238, and on p. 244 a note describing the supernatural properties attributed to jade). Particulars of the jade industry are given by Robert Shaw (*op. cit.*, pp. 473 *sqq.*) who says that "kash" (Kara-Kash, Yurung-Kash, etc.), means jade in Turki. Dr. Stoliczka, geologist to the second Forsyth mission, gives a technical description of the jade mines and deposits, on p. 464 of the Forsyth Report. (See also, on Chinese jade, Yule, *Cathay and the Way Thither*, p. 219, note.) In *Macmillan's Magazine* for October, 1871, Dr. Cayley describes one of the quarries of the Kara-Kash valley. H. von Schlagintweit devotes a whole chapter to the jades of the Kuen Lun (*op. cit.* Vol. IV, pp. 160 *sqq.*), studying them with reference to their mineralogy and their varieties.

[1] So stated by Shaw (*op. cit.*, p. 107). According to Hayward the fort was occupied by Kashmir troops from 1863 to 1866 (*op. cit.*, p. 49); on the other hand, Adolf von Schlagintweit learned that there was a fort at Shahidulla in 1857, though it was not occupied (H. von Schlagintweit, *op. cit.*, Vol. IV, pp. 231 and 258).

of the two missions of Forsyth (1870 and 1873) there is no mention of a fort on the spot. This outpost must therefore have been recently built by the Chinese, to take the place of the one at Shahidulla, which, indeed, I have since heard is now empty and deserted.

Beyond the defile of Shahidulla the Kara-Kash flows eastwards for some distance before cutting through the Kuen Lun range to reach the desert plains of Khotan.[1] Three roads start here to cross the Kuen Lun chain; they lead to the oases of Central Asia by the passes Karlik Dawan (rarely used), Kilian Dawan (16,650 feet) and Sanju Dawan (16,650 feet) to the east of the other two. By this last Dainelli and Marinelli emerged from the mountains when they left us on August 26th to return to Italy.[2]

Four of us remained at Suget—Wood, Abetti, Ginori and myself. The work of the geophysical station kept us busy for ten days. The observations on gravity took longer than usual, because the cloudy weather hindered the astronomical work. We received the wireless time-signals from Lahore very clearly and regularly despite the ever-increasing distance and the intervening mountain ranges. Wood made the triangulation and survey of the ground round the station.

We had a constant annoying wind that often rose to a gale, from which we were but poorly sheltered by the low walls inside which we were encamped. The air was always thick and the sky veiled by fine dust. The wind at this season blew almost continually from the west; but the granite boulders strewn about the valley were particularly worn and pierced by the eolic sand on the sides facing east. It may be that the erosion is caused by whirlwinds and suction. Used as we were to a climate of 16,000 feet and over, the air here seemed warm to us, and we also suffered from the lassitude which is caused by sudden changes of pressure, whether in ascending from lowlands to a more rarefied atmosphere, or in going down after a prolonged sojourn at great altitudes.

The Chinese official appeared obliging and hospitable. But only after five days' acquaintance with us "western devils" did he venture to recall the young woman, dressed in Yarkand costume, with whom he consoled his lonely exile in this desolate spot. He had sent her to Shahidulla on getting wind of our approaching arrival at Suget.

During our stay several caravans passed Suget, going towards Leh; among them one of Indian merchants from the Punjab, who were probably carrying to India the precious hashish, the narcotic drug extracted from hemp. I also had the pleasure for

[1] H. von Schlagintweit justly observes that the rivers north of the Karakoram—the Yarkand, the Kara-Kash and the Keria—either cross or else turn the Kuen Lun range, precisely as the Indus and the Brahmaputra do to the Himalayas (*op. cit.*, Vol. II, p. 7).

[2] They took the main caravan route of Central Asia, by Karghalik, Yarkand and Kashgar, and crossed the Tien Shan range—the route followed later by the rest of the expedition, reaching Ferghana and the railway of Russian Turkestan, which took them to Moscow and Petrograd. Thence by way of Sweden, Germany and Switzerland they returned to Italy, a month and a half in advance of us.

one day of renewing my acquaintance with Dr. Francke, the learned Moravian missionary, archæologist and historian of Ladak, who was on his way from Khotan to Leh. When our work was almost completed, there came showers of rain, accompanied by the usual strong wind, and snow fell on the mountains. On the 4th of September this brief pause in our wanderings came to an end, and we again took to the road for the desert. We had come into the valley of the Kara-Kash by the Suget pass from the

The Chinese official and a group of Kirghiz, at Suget Karaul.

basin of the Yarkand; now we had to rejoin the main course of the Yarkand, below Kufelang, by another pass in the same range lying north-west of the first, the Kokart Dawan, 16,160 feet above sea-level.

We set out in light marching order, leaving behind the cumbersome geophysical equipment, which would be brought later on to Yarkand by the caravan route. We took with us only the few necessary surveying instruments.

The direct route to Kokart Dawan starts from Shahidulla; but we reached it by a gorge on the left side of the valley, where it turns north, not far below Suget. A

little stream runs through the gorge, its banks covered with bushes of *berberis* full of fruit, with *artemisia* and patches of young grasses, dotted with clematis now in seed. In about an hour we had ascended to a shoulder on the left, 13,450 feet high, beyond which we went down obliquely by a slope covered by a thick layer of fine detritus, into the wide valley leading to our pass, called Khal Chuskun.[1] The stream which flows in this valley joins the Kara-Kash at Shahidulla. The valley bottom is level and covered with fairly thick grass growing up through the saline deposit which strews the ground.

An *akoi*, with Kirghiz women.

This was the best pasturage we had seen since the valley of the Indus; and a little farther on we came upon some people busily enclosing a piece of land with a stone wall to make a field. A little beyond were three large Kirghiz tents or *akoi* (*ak-öi*, white house or dwelling), at the *aghil* or shepherd encampment of Jai Konma, where we made a halt.

It was a picturesque spot, among rugged granite mountains. On the east a beautiful mountain, its broad flanks covered with glaciers, towered above Shahidulla, on

[1] According to Younghusband (*op. cit.*, p. 232), the name means "resting-place of Khal"—a legendary saint of Bokhara.

the right bank of the Kara-Kash. We spent quite an Arcadian afternoon amid this delightfully picturesque and pastoral simplicity—not for some time had we felt such lightness of heart.

The *akoi* is a movable dwelling, much more solid than a tent; it resembles the Mongolian *yurta* or the *kibitka* of the Kalmucks and Kirghiz of the Russian steppes. It has been used from time immemorial by all the nomad peoples of Asia, and its construction is very simple and ingenious. There is a wooden frame consisting of a vertical circle of diamond-shaped lattice-work, a little more than 3 feet in height; to the upper edge of this are fixed long thin poles, which are curved to make a rounded dome and joined at the top to a ring some 10 or 12 feet from the ground. On this frame are stretched fitted pieces of thick felt, perfectly joined together. The door is formed by an opening covered by a felt curtain, and the circular hole at the top of the dome serves as window and chimney. In the evening, when the fire is out, that too is closed by a piece of felt drawn over it.[1] Whilst we were setting up our camp, we were invited to go into one of the *akoi*. Our host was a young Kirghiz with three women and three children. The women had Mongolian features, yet not too strongly marked; they wore rings on their fingers and long garments in coloured stripes; the oldest had a dress of Bokhara silk in bright strongly contrasting colours. But the most original part of the female costume is the head-dress, an enormous turban a foot or more high called a *kalak*, made of a white muslin veil that encircles the neck, and frames the face, being wound round a cap which it covers save for two little lappets over the ears and a long band that hangs down the back. Each piece is covered with fine embroidery, and on state occasions, embroidered veils with fringes and tassels are also draped over the *kalak*. The children wear clothes like the men's, with conical hats; they look like little clowns. The mothers nurse them until they are quite big, three or four years old.[2]

In the centre of the room is the hearth, with copper or brass pots in shapes and with ornamentation characteristic of the two Turkestans. Opposite the door is a great pile of felts, carpets, cushions, quilted blankets and bedding, neatly folded and arranged. On the right as one enters some hanging mats cut off a space where the kitchen utensils and large copper or wooden basins for milk, curds and butter are kept. Along the

[1] Marco Polo describes Mongolian tents precisely like these Kirghiz ones. Yule notes that the tent-hut is common to all the nomad tribes of Central Asia. The position of the door varies with the prevailing wind. Ibn Batuta, Rubruquis and Del Carpine describe large *yurtas* erected on wheeled cars (see Yule's *Marco Polo*, 2nd edit., Vol. I, pp. 244–5 and note). But their origin is much more remote. Herodotus describes the movable houses of the Scythians; and does not Aeschylus (*Prometheus Bound*, II, 709–711). speak of "the Scythians, who dwell high above the ground, in wattle houses built on well-wheeled waggons"?

[2] Also in Tibet, and among the Indians, where the child is very commonly breast-fed until the arrival of the next one. W. F. Up De Graff found the same practice among the Atipa, an Indian tribe of the upper Amazon, the women of which do not wean their children till after the third year (*Head Hunters of the Amazon*; London, 1922, p. 213).

Kirghiz group at Jai Konma.

With the wool from their flocks they make excellent felts, carpets, soft woollen cloth, caps, clothing, and the material for their tents. And I saw some rich embroideries which in work and design recalled the Grecian embroideries of the Aegean islands.[1]

Khal Chuskun is a long valley, and it suited us to make a second halt before reaching the pass. The slope was uniformly gentle, among banks and ridges of small detritus which stretch at the foot of the granite ranges. The air was thick with dust from the Central Asian deserts, so that the high crests at the sides of the valley, still sprinkled with snow from the last storm, were scarcely visible, and the sun, in the early hours of the morning, was a dim silvery disc, at which one could gaze without blinking. The valley is open all the way, except for a mile or so where it narrows into a gorge. Farther on it widens again, with a level bed strewn with patches of grass. When Hayward was there in 1868, it was famous for the wild yaks that frequented it. But the presence of the Kirghiz has driven the wild animals away. We saw nothing but some choughs with reddish-yellow beaks, like those around Skardu.

In the upper part of the valley there was an ever-increasing accumulation of fine schistose detritus, especially on the left bank of the river, and then the valley divided into a northern branch with a large glacier ending in a wide snout, and into a western branch which in another two hours led us to the pass, called Kokart Dawan, or the Blue Pass, from the colour of the slates, a wide, deep gash in the ridge, 16,160 feet above sea-level. We climbed at once to a crest on the south of the saddle, but the density of the atmosphere prevented us from seeing anything of the view praised by Hayward.[2] Before him, Johnson passed this way on his return from Khotan in 1865, descending beyond the pass to the western base of the range in the Yarkand valley, but he did not go farther, lest he should run into an ambuscade of Kunjut robbers.[3] He, like Hayward, called the pass Kirghiz. In 1889 Younghusband crossed the Kokart in an expedition against the same brigands.[4] As far as I know, these were the only Europeans in these parts before ourselves.

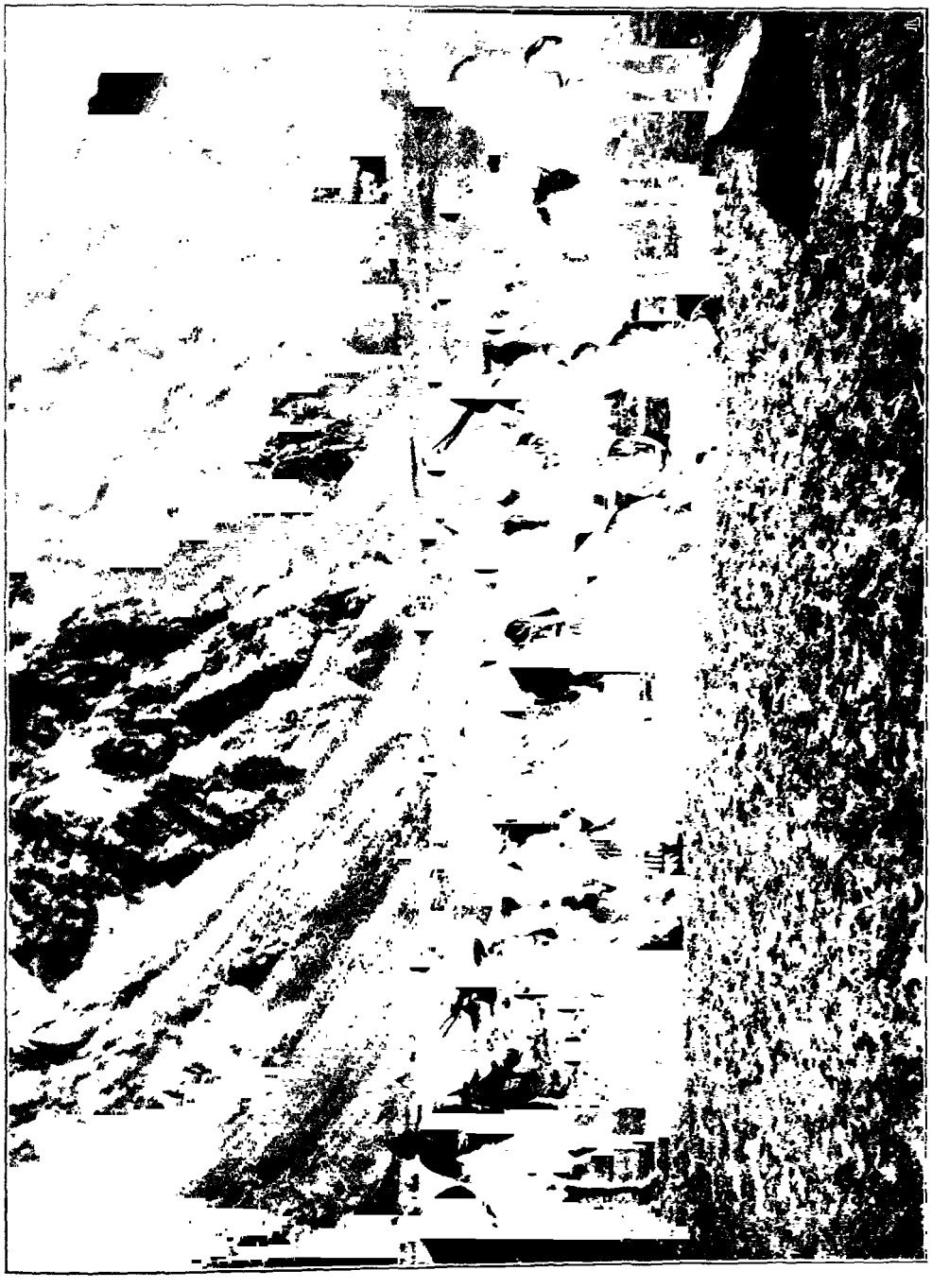
West of the col deep narrow gorges run down to the Yarkand; the path runs at the bottom, choked with blocks of schists fallen from the sides. We quickly descended the little valley to its mouth in the Yarkand valley, about 2,300 feet below the col. Near the junction of the valleys is a squat, square stone building and the remains of some ruined huts. Here a group of picturesque horsemen awaited us, a deputation of Kirghiz, led by the *beg* of Bazar Dara, head of the clan of Arghe, come to meet us.

[1] The above refers only to the Kirghiz of the girdle of mountains south of the Tarim basin, with whom we came in contact. Other information about them, though always fragmentary, is to be found in Lansdell, *Chinese Central Asia*; London, 1893, Vol. I, pp. 120 and 398–405; in the chapter by Bellew and Chapman in the *Report of the Forsyth Mission*, pp. 57 *sqq.*, and in R. Shaw, *op. cit.*, p. 131. Also there is a certain amount of Russian literature on the Kirghiz who live on the Transcaspian steppes and those of Russian Turkestan.

[2] G. W. Hayward, *op. cit.*, p. 53.

[3] W. H. Johnson, *op. cit.*, p. 18.

[4] Sir F. Younghusband, *op. cit.*, p. 232.



Kirghiz delegation at Kirghiz Jangal.

We were escorted to a camping-ground called Kirghiz Jangal, a little lower down on the right bank of the river, among a few stunted bushes. The Yarkand valley is here about a third of a mile wide, deeply sunk between high steep-sided mountains, which are the buttresses of the Aghil and Kuen Lun chains. The river was full and rapid and coffee-coloured, and so turbid that it was impossible to guess its depth.

In old times this place was often frequented in the summer by Kirghiz from the west, from Sarikol and the Pamir; it was not unheard of for them to rob caravans on the Yarkand route, between one of the passes of the Western Kuen Lun, the Chirak Saldi or the Yangi Dawan, and Kufelang. But they later gave place to some veritable raiders, the Kunjuts, from the remote mountain lairs of Hunza and Nagar.[1] Surrounded on all sides by the great glaciers of the Western Karakoram, the Kunjuts came through the Shimshal pass to the Shaksgam valley, and thence to the Yarkand, following it up to the caravan route, where they would lie in ambush, in bands strong enough to get the better of large parties of merchants.[2] Sometimes they penetrated as far as the valley of the Kara-Kash and waylaid the trade caravans by Shahidulla: sometimes they even ventured beyond the Karakoram, and ravaged the villages of Ladak and Baltistan, stealing cattle and goods and dragging the wretched inhabitants away to be sold into slavery in Turkestan. The accounts of the first European travellers who visited the towns of Turkestan contain tales of Baltis, Ladakis and Kashmiris kept in slavery until ransomed.

In 1889 the Government of India commissioned Captain Younghusband, with an escort of only six Gurkha soldiers, to make a reconnaissance of the routes used by the robbers, and to suggest a remedy for the evil which threatened to paralyse trade between India and Central Asia.[3] Younghusband went through the upper Yarkand valley and part of the Oprang-Shaksgam to the Shimshal pass.[4] In order to give security to commerce and to the inhabitants it was found necessary to get at the root of the evil, and conquer Hunza and Nagar (1891–2). Afterwards the two little states were put under the effective rule of the kingdom of Jammu and Kashmir and have since lived at peace with their neighbours.[5]

[1] See Knight (*op. cit.*, p. 350) for some interesting information upon these people, of Dard stock. Those of Naga are Shiahs, those of Hunza of another sect of Islam, called Maulai. They accept the Bokhara Sheriat, which is less severe than the Koran and permits them to drink wine.

[2] Hayward (*op. cit.*, p. 54) tells of a successful ambush by a band of 120 robbers, to whom a large company of Kashmir merchants fell victim. See also Knight, *op. cit.*, p. 347, on the Kunjut raids.

[3] The story of this daring enterprise is told in Chapters IX and X of Younghusband's book.

[4] The rest of the route used by the Kunjuts between Hunza and the Shimshal pass, was explored by General Sir George K. Cockerill, who gave an account of it in a lecture before the Royal Geographical Society (see "Byways in Hunza and Nazar," *Geog. Jour.*, Vol. LX, 1922, p. 97). The latest explorers of the valleys of Hunza were Mr. and Mrs. Visser, in 1925. (See *Among the Karakoram Glaciers*; London, 1926.)

[5] For a description of this military campaign see Knight, *op. cit.*, pp. 345 *sqq.*

Some days before our arrival at Kirghiz Jangal, Jamna Prasad had arrived by the Ak-Tagh–Kufelang route, with a caravan of supplies. Here Wood left us again, to rejoin Spranger and Petigax at Kufelang, and carry out with them the exploration of the western tributaries of the upper Yarkand, as related in Chapter XIII.

Between Kufelang and Kirghiz Jangal the Yarkand takes a very tortuous course with a general trend from south-east to north-west; there are deep, dark, narrow gorges enclosed by vertical spurs hundreds of feet high, which interlace in such a way as to give the impression, renewed at every turn, that the valley must be closed a few hundred yards farther on, and that the river, seething in the narrow space between the black rocks, must fall into some chasm. Of course there are frequent fords to be crossed, some of them not free from danger.

The gorges come to an end a little above Kirghiz Jangal, where the valley opens out again, taking a sharp turn westward, and then keeping the same course for some 20 miles. This part of the valley goes by the name of Raskam Daria.[1] It is even grander and more impressive than the Indus valley in its course through Baltistan and Ladak, also wilder and more utterly barren.

At the bottom the river winds through a large bed of sand and pebbles, generally divided into several streams which ceaselessly eat away the sides of their channels and form new beds. On the narrow terraced banks there was no vegetation except a few bushes of a kind of tamarisk, already tinged with autumnal red, scattered here and there in clumps with some scanty grass. Above them, more or less steep banks of shingle rise to various heights against the black schist and granite rocks. The sides of the valley are cut by deep tributaries, at whose mouths stretch large high alluvial cones, bisected by the stream, which often stretch out as far as the main river itself, and end in a steep perpendicular ledge, worn away below by the current. Through the valley mouths you get glimpses of the glaciers and snowy crests of the ranges which flank the valley, the Kuen Lun to the north and the Aghil to the south. The largest streams come down from the Aghil, that is, from the left side of the valley.

The road is very tortuous; the spurs projecting into the valley constantly force one to ford the river, which fortunately, as I have said, was usually divided into several branches. Nevertheless, in spite of our tall, strong Yarkand horses, the fords were neither easy nor pleasant; the water was swift and deep, and on its current whirled and tossed uprooted bushes; the river-bed was often shifting and treacherous. But the Kirghiz are daring horsemen and well acquainted with the work; they guided us very skilfully. Generally one of the *begs* went first, testing with a long pole the depth of the water and the state of the bottom. We followed him at a distance in single file. The horses went into the water without hesitation, and recovered themselves stoutly when they stumbled or slipped on the gravel, or sank into a quicksand; but it was unpleasant for the rider.

[1] *Daria* means river, *dara*, valley. *Raskam*, according to Younghusband, is a corruption of *rastkam*, meaning mines (*op. cit.*, p. 234).

A peculiar giddiness seizes you. The banks of sand or gravel, the dry twigs or anything else sticking up in the water, seem to be moving against the current, or to be coming towards you; and you cannot see that the horse is making progress, it seems only to be moving sideways. One must trust to its instinct and give it free rein. For this sort of work the horse is better than the camel, which if it slips or is knocked down is sure to drown, as it cannot swim. Yaks, too, are said to swim well, and for long distances.[1]

Alluvial terraces in the valley of the Raskam Daria (upper Yarkand).

Marches of this kind always turned out to take more than double the average time. On September 7th when we left Kirghiz Jangal to begin the descent of the Raskam Daria, we took eight hours to get about 6 miles down the valley, fording the river five times, and climbing up this side and that to the high terraces and alluvial cones on its banks.

We made a halt on the left bank of the river, opposite a large valley with a moderate

[1] H. Schlagintweit (*op. cit.*, Vol. IV, p. 39) devotes an entire page to the sensations of giddiness and unreality experienced while fording a stream on horseback. Elsewhere (p. 198) he says that camels are better for fording than either horses or yaks.

gradient which runs far in among the spurs of the Kuen Lun and leads to the Yang Dawan (new pass), which is the autumn route between Central Asia and Ladak, ascending the Yarkand or Raskam Daria as far as Kufelang and rejoining the Shahidulla route at Ak-Tagh, then going on to the Karakoram pass and beyond. A little above our camp on the right bank of the Raskam is the camping-place Kulan Uldi (death of the Kulan, the Turki name for the kyang, or wild Tibetan ass). This is the halt for caravans coming to or from Yangi Dawan.

The existence of this pass and this route between the Karakoram and Turkestan was discovered by Hayward in 1868. However he did not ascend to it, but climbed a peak of the Kuen Lun near it, and saw, towards the south beyond the Raskam Daria what he thought was the Karakoram, but what was in fact the Aghil range.[1] The members of Forsyth's second mission, in 1874, took the Yanghi Dawan route on their return from Kashgar.[2]

[*Phot. Spranger.*

Looking north-west from the Yangi Dawan.

Almost a month after us, Wood, Spranger and Petigax reached this spot, after finishing their exploration of the western tributaries of the upper Yarkand, and entered the valley of the Yangi Dawan, which runs up to a narrow gorge, ending in open stony slopes that lead up to the pass (16,500 feet, according to Hayward). From here there is a beautiful view of the Aghil range. North of the pass a series of steep and narrow gorges among precipitous walls bristling with sharp and towering rocks, called Sorok Jilga (the cold valley), lead to the valley of the Turaghil, one of the sources of the river Tiznaf; thence down to the foot of the Ak-Korum pass,where the road joins that taken by us, as I shall shortly describe.[3]

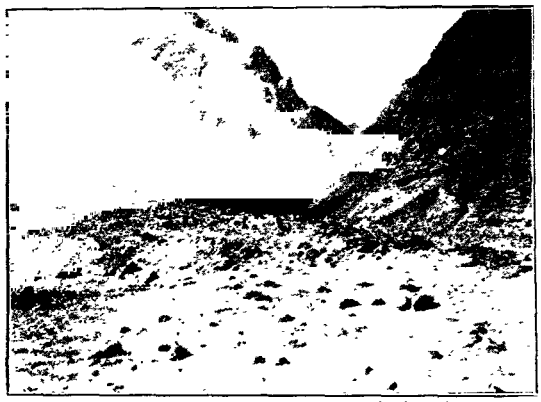
A little below the mouth of the valley of the Yangi Dawan the Raskam Daria unites in a single stream, between two large banks of conglomerates heaped at the mouths of two opposite tributaries. The right-hand one is a small unimportant stream, the left a considerable torrent, cutting a wide, deep bed in the alluvial bank. This tributary penetrates deeply into the mountains [4] and we noticed in it a kind of path, but our

[1] See G. W. Hayward, *op. cit.*, pp. 55 and 57. [2] Forsyth, *Autobiography*, p. 197.

[3] For further particulars of the Yangi Dawan route, see Wood's *Report*, pp. 23 *sqq.*

[4] Drew's map is the only one I have seen which clearly shows this valley, marked Tynzap. Its course, however, is fanciful; for at that time (1875) there was no knowledge of the Aghil range, nor of the Shaksgam valley, between the Raskam Daria and the Karakoram.

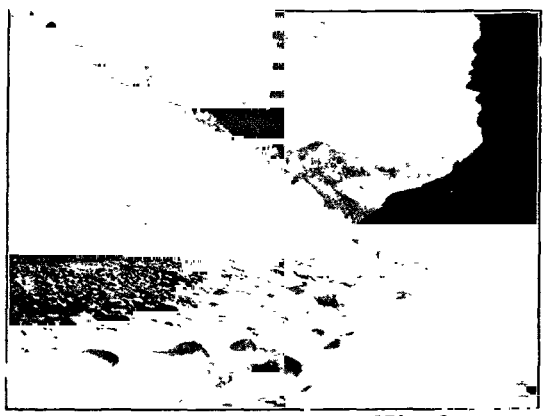
Kirghiz said it was a track made by the *kulan* or *kyang*, and firmly denied that any road ran through the valley or even that it had a name. A few miles lower, on the right, another important tributary opens among the spurs of the Kuen Lun, leading to a second pass of the chain, called Chirak Saldi (16,330 feet) which like the Yangi Dawan leads to the Tiznaf valley. Younghusband crossed this pass to reach the Raskam Daria in 1887, in his memorable journey from Yarkand to Baltistan across the Mustagh pass of the Karakoram.[1] On the stretch of flat terrace which extends near the opening of the Chirak Saldi valley, strewn with huge granite blocks fallen from the mountain-sides and dotted with tamarisk shrubs, we found a caravan of Kirghiz and Yarkandis bound for Leh. There had also arrived a fine herd of 43 yaks, which we had hired for the transport of our goods across the spurs which we should encounter farther on. We attached them to our caravan and continued on our way.



[*Phot. Spranger.*

The Sorok Jilga, north of the Yangi Dawan.

The valley, which is large and open all the way from Kirghiz Jangal to this point, changes after Chirak Saldi, becoming more and more shut in by mountain spurs which finally force the Raskam Daria into a single bed. The fords are no longer practicable, and henceforward we kept to the right side of the valley, getting over the spurs by a path which was hardly more than a track. At times we were forced to unload the animals and drive them one by one. We crossed the valleys enclosed by the side spurs, at the foot of steep walls, deeply carved out by the disintegration of the rocks, as the ruins of stones and boulders on our path bore witness. One of these, a granite block, was covered with graffiti of ibexes in every way similar to those we had seen in the Indus valley. Passing a narrow elbow of the valley, 500 feet above the bottom, we descended again by a series of terraces to a circular plain on the

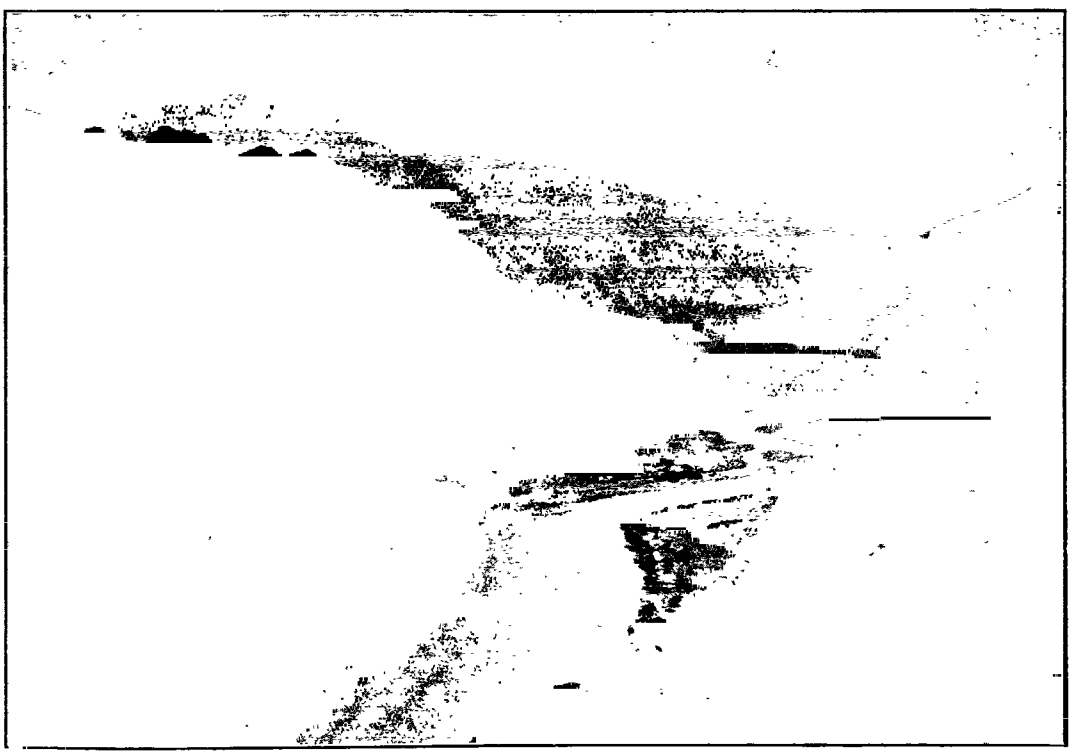


[*Phot. Spranger.*

The Turaghil valley.

[1] Younghusband *op. cit.*, p. 179.

bank of the river, some 600 yards across, where there was a delightful meadow with a spring rising in the centre. Since Kirghiz Jangal we had had no clear spring water for cooking or drinking; so we made a halt. The place is called Urdek Saldi, and is most picturesque. We were at the foot of an imposing peak of rocks and ice, with a precipitous southern wall, which we had been admiring for two days as we slowly approached it.[1] A short gorge comes down from it, in which a large stream flowed.



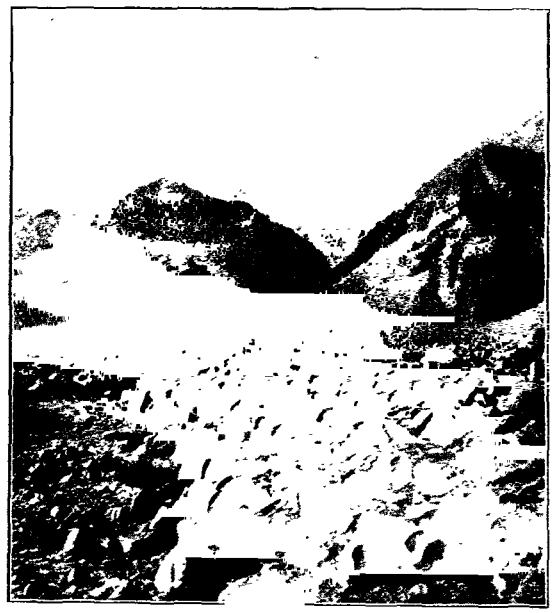
The Raskam Daria below Chirak Saldi.

We reached the halt at sunset, and by the time we had pitched our tents and cooked supper it was night. All round us our people—servants, Ladaki coolies, *beg* and Kirghiz guides—squatted in groups by the camp-fires. The horses were tethered by twos, crossways, the rear one's head tied to the tail of the one in front so as to prevent their lying down or grazing. They were never let loose until several hours after our arrival at a halt. The camels squatted in a row, fastened by their bridles to a rope stretched close to the ground; the yaks stood or lay in motionless groups, tranquilly chewing

[1] This peak forms part of a group of mountains of the Kuen Lun, also noticed by Hayward and by Younghusband (*op. cit.*, p. 233).

the cud. In a firelit corner was the small flock of white goats and Yarkand sheep. Above us towered the high black sides of the valley against which reverberated the sound of the rushing stream and the river's deeper roar.

The next day, a short march of two and a half hours on the right bank of the Raskam brought us to Bazar Dara. The river flowed all the way in one bed between high alluvial terraces; remains of other terraces clung to the walls, as high as 600 or 700 feet. The rocks are schists, covered with fine detritus of a metallic black that glistened in the sun. The high ranges behind the spurs seemed to be granite; at the foot of all the



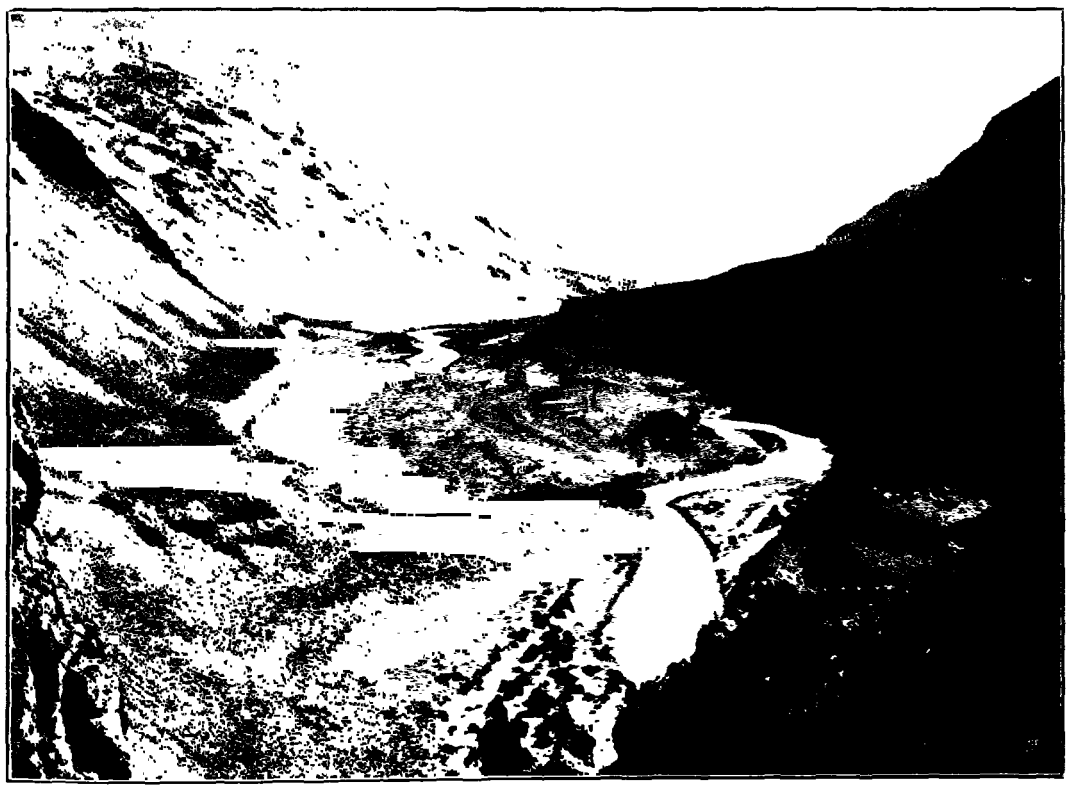
Urdek Saldi.

gorges and tributary valleys were large alluvial cones and terraces covered with granite blocks, some scratched with graffiti of ibexes. Half-way we crossed a level tract where shrubs had grown up round the ruins of some old walls.[1]

The Raskam Daria describes an acute angle round a spur which comes down from the big peak above Urdek Saldi; we surmounted the spur, passing through a cleft so narrow that we were obliged to unload all the animals; indeed, the place is called Igar Alde, or "take off the saddle." Beyond the spur we crossed some wide declivities which gradually descended to Bazar Dara, at the point where a tributary valley joins

[1] Younghusband mentions these ruins, among which are the remains of a smelting furnace—a sign of a mine at no great distance—by the name of Karash Tarim, "oasis or cultivated place of Karash" (*op. cit.*, p. 234).

the Raskam. Just at the corner, on the right bank of the two rivers (not on the left bank of the Raskam, as shown on the maps), 12,070 feet above sea-level, are two small forts. The older one is just a square of ruined masonry, the other, a hundred yards or so lower down, has walls on three sides made of gravel, cemented with mud, the fourth side being formed by the rock of the corner spur between the two rivers. There was a muddy inner courtyard, and a few little rooms along one side. It seems that this



The Raskam Daria above Bazar Dara.

was built by the Chinese about the same time as the fort at Suget. Once a year a Chinese official comes hither to collect taxes from the Kirghiz of the district. The small level space around the forts is marshy and full of weeds; we had difficulty in finding a dry spot to pitch our few tents. The place is enclosed between rugged black walls; the one above us, at the base of which are the forts, is cleft by a great red streak of broken stone running straight down to the valley; it is an old iron ore quarry among the schists.

Directly below the confluence, the Raskam Daria enters a succession of deep and very narrow gorges, beyond which on the left bank is the mouth of the valley that leads

to the pass in the Aghil range, the door by which we meant to enter the Shaksgam valley, by the route taken by Sir Francis Younghusband (1887 and 1889). Ever since we had entered the Raskam valley, these gorges had been the subject of much anxious thought and consideration; the Kirghiz in our escort declaring that we could not possibly cross them with the river in its present swollen state. But along with the hired yaks which had reached us at Chirak Saldi we had acquired an old man of much experience who knew the roads and the natives, and quickly dissipated our fears by his calmness and confidence. He was an *aksakal* (grey beard): one of those elders who are elected in the towns of Turkestan by reason of their good sense and wisdom to be arbiters or justices of the peace; they also act as consuls for foreign subjects. This old man declared he knew a way across the spurs of the right bank of the Raskam, which would bring us out opposite the opening of the Aghil valley, at a point where we might hope to ford the Raskam itself. He had been by this way when as a young man, with twenty-one companions, he had been taken prisoner by the Kunjuts and dragged off to Hunza, whence they had been ransomed at 160 rupees each. We later discovered that our Kirghiz knew this pass quite well, but did not wish to admit it, hoping we should be forced to give up the project of the Shaksgam, and thus reach Yarkand in time for them to join some other caravan bound for Leh.

Arrival of the caravan at Bazar Dara.

We stopped a whole day at Bazar Dara for survey work, and started on our way on the morning of September 11th, by climbing the steep right side of the valley overlooking Bazar Dara. There was a path among the detritus of schists and quartz, with signs that caravans had recently passed along it. The ascent was very steep and exhausting, certainly impossible for laden horses; we had with us only the yaks, both for riding and for the baggage. To be in the saddle, on that broad, powerful back, with its upholstery of thick wool is like sitting in an arm-chair. The yaks are black or white, tawny or piebald; they have large heads and small deep-set eyes like the bison, with great curved horns, which, however, are sometimes lacking altogether. The withers are high and prominent, covered by a tuft of hair which develops into a small mane; the tails magnificent, with long, thick hair all the way to the ground. Their strong short legs, which seem so ill-suited to the enormous bodies, carry them up the high rocky ledges and the steepest slopes with wonderful ease and surefootedness. They climb slowly, however, with lowered heads and muzzle almost to the ground, painfully

panting, with strange wheezings and grindings of the teeth, and spasms of asthmatic coughing; giving the impression of tremendous effort. The nostril is perforated to admit a rope tied with a slip-knot; by this means they are easily led.[1]

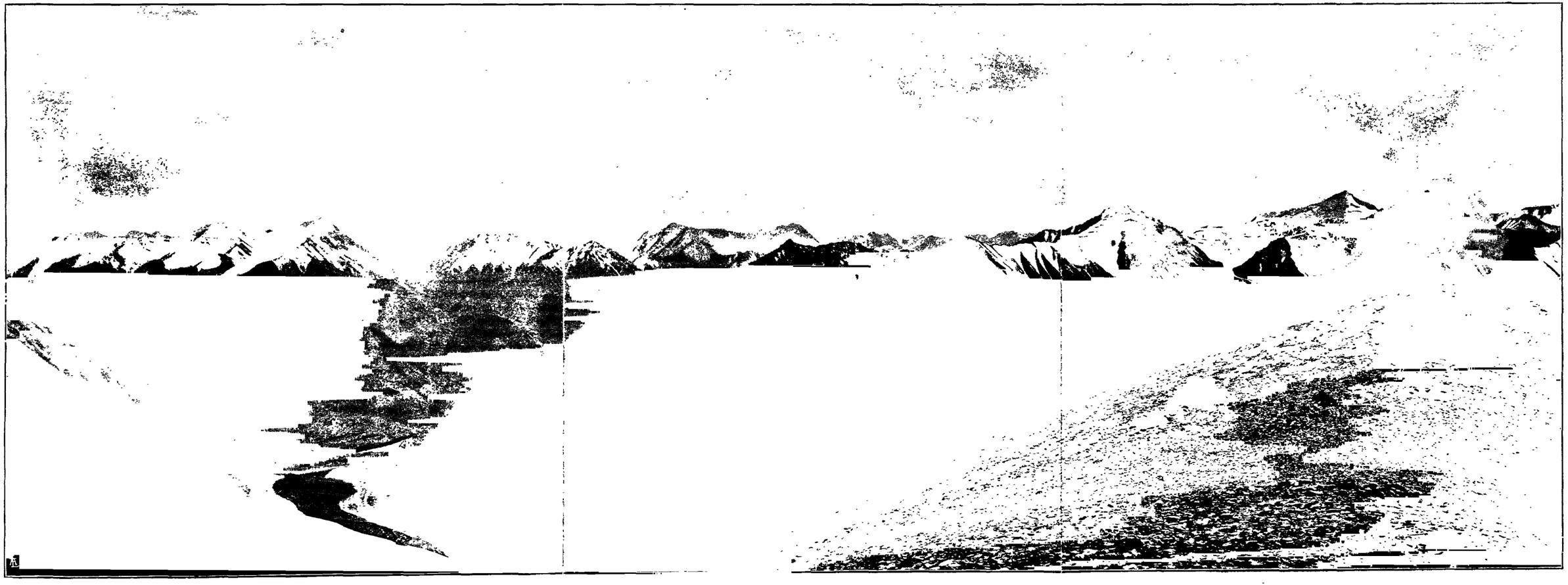
Some of the Kirghiz did not wish to be parted from their horses, and made the

Our mounts between Bazar Dara and Surkowat.

ascent on foot, leading the horse by the reins. One of them sang a monotonous refrain —very unusual, for as a rule they were silent. Even the Ladaki porters who had

[1] I have mentioned elsewhere the cross-breed of the yak and the common Indian cattle called *zho*. As for the domesticated yak, it is not clear whether it is a species subjugated for generations to man and so become different from the wild yak, or whether the stock has been bred from time to time with the wild. Yaks have been used for centuries all over Mongolia. Marco Polo mentions them (Yule, 2nd edition, Vol. I, p. 266, p. 268 and note). Hamilton Bower (*Diary of a Journey across Tibet*; London, 1894, p. 286) describes the great skill of the yak in crossing glaciers and its sagacity in avoiding crevasses. Sven Hedin ("Travels in Central Asia," *Geog. Jour.*, Vol. V, 1895, p. 154, and "Attempts to ascend Mustagh Ata," *Geog. Jour.*, Vol. VI, p. 350) speaks of having climbed with yaks to 21,000 feet on the sides of Mustagh Ata, the highest peak of the Kashgar range.

The Raskam Daria (upper Yarkand) at the junction of Bazar Dara.



SURKOVAT VALLEY AND AGHIL RANGE FROM A RIDGE ABOVE THE RASKEM DARIA

followed us from the Depsang seemed to have lost their demonstrative gaiety since crossing the Karakoram and leaving their own country.

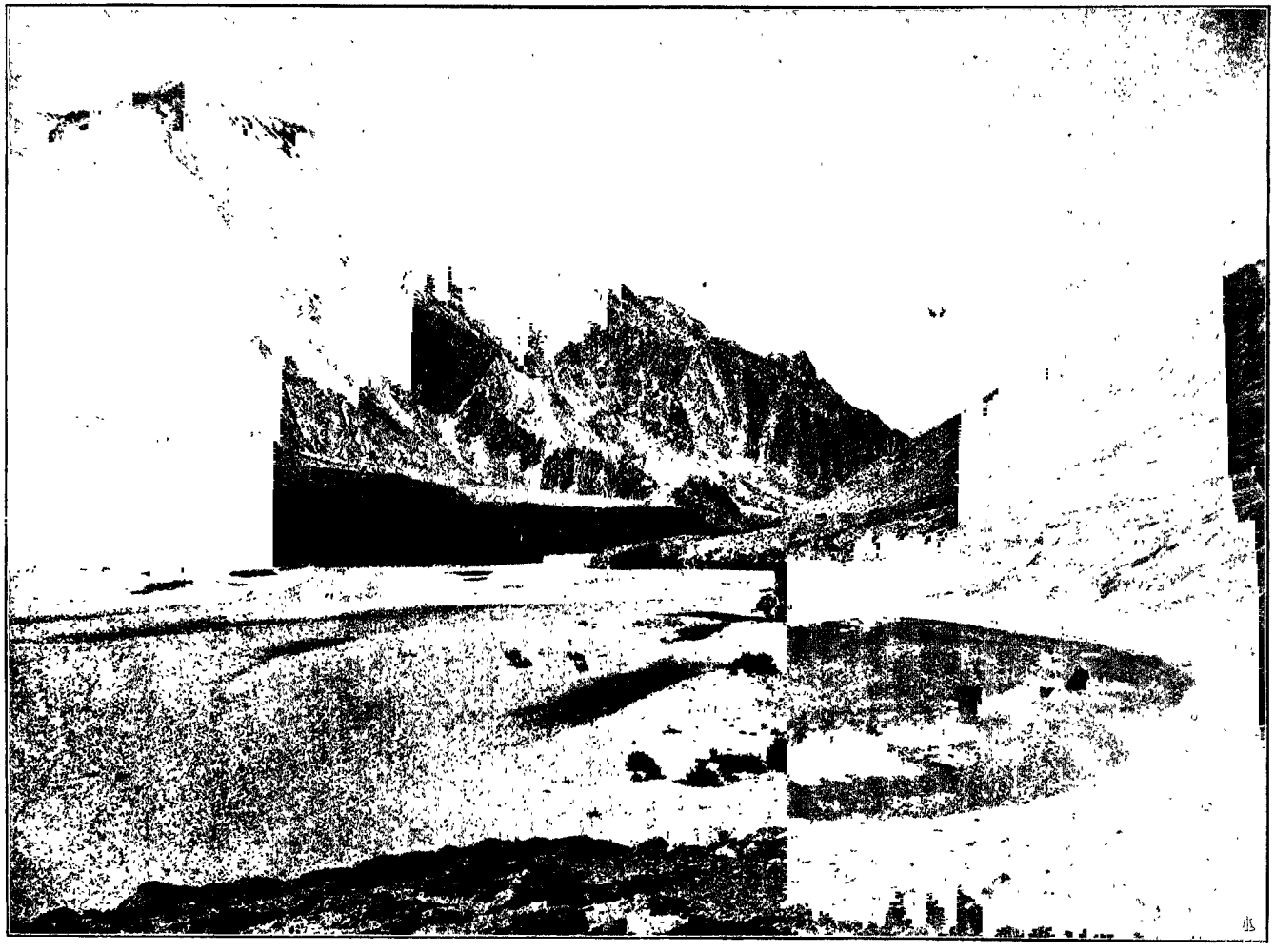
We took nearly three hours to reach the crest of the spur, 1,600 feet above Bazar Dara. Owing to foggy weather, we could see only the nearest mountains. Beyond the crest a slope descends, as precipitous as the one we had climbed up; at the bottom of it we caught a glimpse of the Raskam Daria rounding the foot of the spur we had surmounted. We slanted down towards a little valley, where we halted in a meadow, among thick shrubbery near a little stream which afterwards breaks into falls down a narrow gorge to the Raskam Daria. The camping-place is called Kichik Burelik. The sky had clouded over: we had a wet afternoon and evening.

On the second day, longer and more tiring than the first, we crossed two spurs; ascending the first by a slope covered with such small shingle that the poor yaks were knee-deep in it; then by a less rugged way, reaching a second shoulder, 15,080 feet above sea-level. More than 3,000 feet below us the Raskam Daria glittered at the bottom of a deep abyss between tremendous cliffs of black rock. But our attention was at once drawn to the Aghil range, vast, impressive, glacier-covered. Certainly it showed us but few of its peaks, and those not the highest, which were wrapped in storm-clouds. At its base two spurs embrace a wide opening on which two valleys converge, the Surkowat, which comes down from the east, and another facing it, which leads to the Aghil pass. The two tributaries join here for a short stretch, before flowing into the Raskam Daria.

We waited in vain for almost two hours, for the sky to clear. Then, having surmounted another lower crest, we descended the steep slopes, likewise covered by a deep layer of shingle, with occasional tufts of *burtze*. The yaks went down with unexpected agility, raising a cloud of dust. It was drizzling and the weather was heavy and stifling, in spite of occasional puffs of wind. Finally we reached the bottom of the Raskam valley, and pitched camp in a sandy semicircular recess on the right bank of the river, almost opposite the mouth of the Surkowat. The stream has cut itself a narrow opening into a flat terrace, about 100 feet high, lying across the mouth of the tributary valley. To right and left of this opening two symmetrical round-topped rocks abut upon the level of the terrace, and there are two others indicating another passage through which the river flowed in times past.

We were in a short widening of the Raskam valley, between the narrows of Bazar Dara and another series of tortuous gorges, the entrance to which we could see a little farther down. For a few hundred yards the river, muddy, swollen, threatening, is divided into two branches, each one from 25 to 35 yards wide; elsewhere it is a single current.

One of the *begs* took off his clothes, except his shirt, and went into the water on his horse; which after a few steps lost its footing, and regained the bank with difficulty. Then the horse was sent into the water alone, with a long lead, at three different points, but every time it had to swim back to the shore.



Our camp on the right bank of the Raskam Daria, opposite the Surkowat.

The Surkowat flowing into the Raskam Daria.

Then something typically Eastern happened. Somehow, no one knew how, the rumour spread that some camels were grazing on a patch of vegetation on the other bank of the Raskam, opposite our camp. We went somewhat farther down the valley, where there was another short bifurcation of the river, and the *beg* and one of the Kirghiz rode in. The horses swam bravely, and succeeded in reaching the opposite bank, carried by the current at least 300 feet below the point of departure. They disappeared among the bushes, and after half an hour reappeared driving before them five camels. Only one of them was full-grown, one half-grown, the other three were young. They would give us the measure of the depth of the river. Urged by the voices of the horsemen, they plunged into the stream, but before reaching the middle of it, only the head and humps of the largest camel appeared above the water. It reached the right bank with the greatest difficulty, while the rest, who had lost their footing, managed by a miracle to land much farther down the valley.

We were cruelly disappointed. It did not seem possible that we should be stopped by 60 or 70 yards of space and not know how to get across it. We, of course, could swim our horses across the stream. But our camp, the provisions for ourselves and the porters, the equipment without which we could not live a day in those desert lands, and the caravan needed to transport it—how could we get all that across? The Kirghiz told us that the water usually goes down at this season—towards the middle of September; but here again we were suffering from an exceptionally bad season.[1] At Karghalik and Yarkand there had been floods like those at Leh, and everywhere the rivers were unusually swollen. The sky continued cloudy, it snowed on the crests and mountains; in the valleys there was a wind laden with dust and sand, and heavy rain fell towards evening and continued all night. The *aksakal* who had accompanied us from Chirak Saldi was sent back to Suget Karaul to take over the baggage containing the scientific instruments, and convey it to Yarkand by the caravan route. We then explored this bank of the Raskam as far as the entrance of the gorges below our camp without finding a spot where another ford might be tried. A hydrometer made from a graduated wooden pole stuck in the sand in a little inlet showed us that the level of the river had risen since the day before. In these two days Jamna Prasad had climbed the spurs behind the camp, but he had not been able to fix any points of the Aghil range owing to cloud and bad weather. Everything pointed to the necessity of giving up our plan. We had to consider that even if we succeeded in crossing the Yarkand, we should find ourselves, beyond the Aghil, confronted with the Shaksgam, which,

[1] In early September of 1889, Sir Francis Younghusband was able to ford the Raskam in the gorges between Bazar Dara and Surkowat, and the water was clear and transparent (*op. cit.*, p. 236). Captain H. H. Deasy, in 1897, arriving from Pamir by the Ili Su pass, went up the Raskam to Bazar Dara and traversed the narrows to Surkowat on December 5th. He says that even at that season the horses and mules had hard work keeping their footing, so deep was the water and so strong the current (*In Tibet and Chinese Turkestan*; London, 1901).

according to Younghusband, is a river of no less size than the Yarkand and even more difficult and dangerous to ford.[1]

What little we had been able to see of the Aghil range revealed it as a complex and intricate system of mountains and glaciers, such as would amply justify, together with the exploration of the Shaksgam valley, a special expedition occupying the whole season instead of the few weeks which lay between us and the early winter of the heights ; and that view is entirely borne out by the subsequent explorations of Major Mason and the Duke of Spoleto.

Our experience, added to that of our few predecessors, showed that it is useless to set out to explore these valleys without some means of crossing the rivers—in the form, perhaps, of a collapsible boat, or of one or more rafts with suitable floats.

[1] Sir F. Younghusband, *op. cit.*, p. 254.

CHAPTER XVI

FROM SURKOWAT TO KASHGAR; EASTERN TURKESTAN

Return to Bazar Dara—The Kukalan Dawan—The Takta-Korum—The Pakpus or Tagliks—The Pakpu Dara—The Ishak Art pass and the Tiznaf valley—The Ak-Korum pass—Ak-Masjid—Kök Yar—Besh Terek—Karghalik—The Tarim basin—The *Amban* of Karghalik—The bazaar—A Chinese dinner—The caravan route of Central Asia—Arrival at Yarkand—Yangi Shahr and the Residency of the *Amban*—Chinese suspicions—News from Europe—Yangi Hissar—Arrival at Kashgar.

ON September 14th we painfully re-climbed the long steep slope by which three days earlier we had come down to the banks of the Raskam, turning our backs upon the Surkowat and the Aghil, with our minds full of the thought that we had finally set our faces homeward. The campaign of exploration was definitely closed, and the geophysical stations that we had yet to do would be but short pauses in our return journey.

It had rained all night at brief intervals, and in the morning we found our hydrometer completely submerged. The sides of the mountains were covered with new-fallen snow to within a few hundred yards above the valley, and mist and clouds shrouded the peaks and high crests. All around there was an autumnal look which harmonized with our farewell to the mountains.

The next day, after having again surmounted the second spur, we encamped for the second time by the fort of Bazar Dara. Here the Raskam Daria is joined by a trib-

utary which comes down from a pass of the Kuen Lun chain, 16,400 feet above sea-level, the Kukalan Dawan. We had decided long before to come out by this pass from the upper Yarkand valley. The pass leads to the valley Kulan Arghe, in which flows another tributary of the Yarkand. Having crossed this, and got over another chain by the Takta-Korum pass, 17,390 feet high, one enters a system of valleys which form part of the upper basin of the Tiznaf, an important river that runs parallel to the Yarkand for a good distance in the plain of Turkestan and then loses itself in the sands. There are two more spurs between these tributary valleys of the Tiznaf, to be crossed by the Ishak Art and Ak-Korum passes; then at last one reaches the towns in the plain. It is a cross-road, running almost directly south and north; but rough and exhausting beyond words.

Only one European seems to have passed over the Kukalan Dawan before us, Captain Deasy, in 1896.[1] We therefore instructed Jamna Prasad to make a survey of the route across the mountains as far as Karghalik and gave him the means of travelling independently, with a small caravan of his own.

Leaving Bazar Dara, after traversing a short flattish stretch, we entered the tributary valley, enclosed within steep sides, with deeply cleft secondary gorges which seemed like fissures in the walls. In the lower part of the valley on a narrow flat terrace along the left bank of the stream is a long line of ruins, the remains of a village of miners or gold-diggers. This was the old village of Bazar Dara. The holes and little shafts can still be seen in the neighbourhood. Among the ruined walls of the houses is a large square, the site of the fort, while stone enclosures mark the place where up till about a century ago the horse- and cattle-markets were held; this and a flourishing bazaar provided for the needs and served the trade of the inhabitants of the Raskam Daria, until the incursions of Kunjut raiders made a desert of the whole region.

In those times, there was probably a fair road through the valley. Now no trace of it remains. For long distances above the village the gorge becomes a regular ditch, full of a confusion of big granite blocks, among which the torrent tosses and foams. We had to dismount and pull the horses after us, jumping from rock to rock, and only mounting to cross the streams or some pool of water. We forced a passage through many recent landslides, by rolling away pieces of rock. Through the narrow openings of the tributary valleys, all granite and schist, with astounding precipices of smooth rock hundreds of yards high, we could get glimpses of the highest peaks of the Kuen Lun chain, some of them glacier-covered.

We halted in a short stretch of open valley, pitching our tents on a sandy little island in the river-bed. It was raining and sleeting by turns and there was a possibility of a flood; but the danger of falling stones from the walls was even more imminent. Above our bivouac the valley again narrows into gorges, then opens out as it curves

[1] See A. Deasy, *op. cit.*, pp. 122–5. Having crossed the pass he descended the Kulan Arghe, reaching the plain by a different route from ours, without entering the Tiznaf Valley.

north-west at this point; we left it to climb a tributary gorge on the left, which brought us to a wide open coomb at the foot of the pass, a long depression in the principal range. Small isolated glaciers clung to the slopes about us.

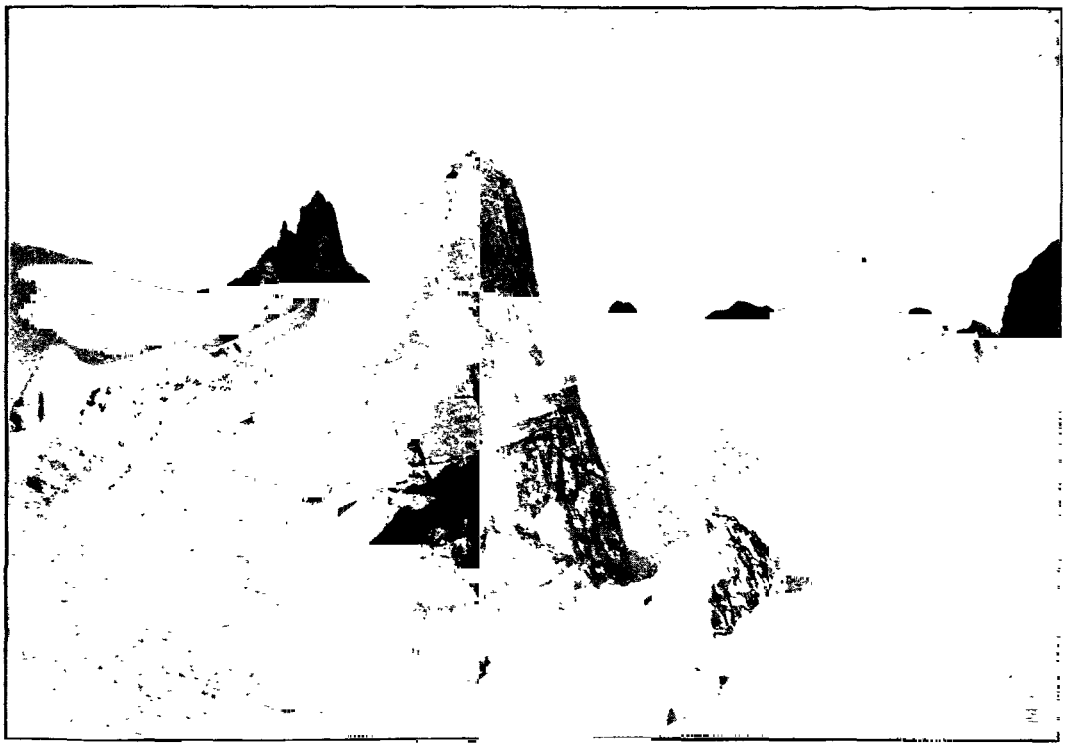
On reaching the pass, we saw to the north a long chain of steep black mountains, a branch of the Kuen Lun, which we had yet to cross to issue out of the basin of the Raskam Daria. In front of this stretches a minor spur surmounted by a rocky curtain

Approach to the Kukalan Dawan.

of yellowish marble, 350 feet high, thin and toothed like a saw-blade. It stands out above the black schists, and probably suggested the name of the pass: Kukalan, or "many-coloured stones."

We descended from the col to a little open valley, amid shrill whistles from frightened marmots; alarming a large flock of *burral*—wild sheep—which dashed away in disorder. On our right extended the marble formation which I have mentioned; at one point it came down from the crest of the spur in separate portions like stage wings, that rose 200 or 250 feet above the black rocks; then it left off, except for an isolated tooth in the valley bottom, to reappear again on the opposite side. It looked like

a fortified barricade. At last we came to the large valley of Kulan Arghe (*kulan*, the Tibetan *kyang*, or wild ass, and *arghe*, running water) at a place called Kukalan Aghze (*aghze*, mouth of a valley), 2,615 feet below the pass, and here we camped by the river, which is, as I said, a tributary of the Yarkand. On the opposite bank was a shepherds' camp, an *aghil*, with a tent, a herd of yaks, and a flock of sheep, guarded by large wolf-like Kirghiz dogs.



Marble peaks north of the Kukalan Dawan.

The next day, September 18th, we crossed the second range, and passed from the Yarkand into the Tiznaf basin. The ascent fell into two parts, the first slope bringing us to a large, nearly flat, terrace strewn with granite blocks. At the base of the final slope this is cut by a limestone curtain similar to the one we noticed in the descent from the Kukalan, but smaller. Then a short but very steep rise leads to the top of a uniform crest, with inconsiderable depressions. This is the Takta-Korum, or "rocks like flat tables," 17,390 feet high. The view of the mountains was spoilt by clouds and thick mists, and the valley we were to descend into was also filling up. We crossed the end of a small glacier which descended from the east, and came on a frightful waste of great

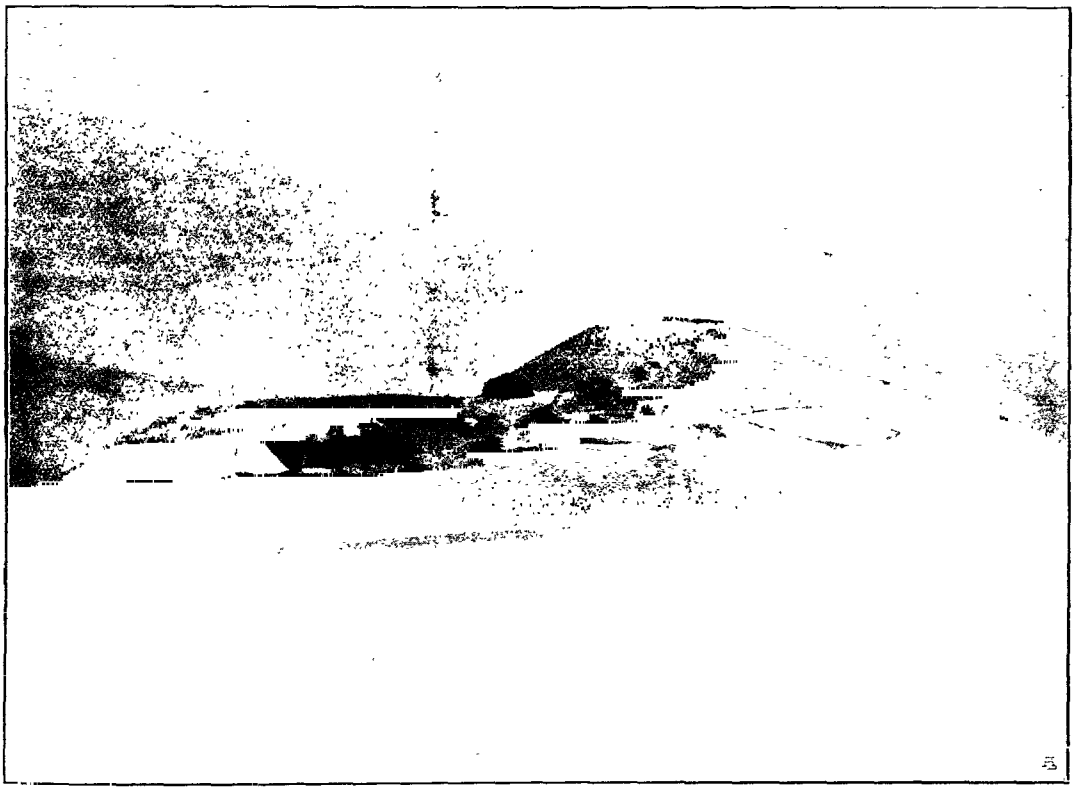
granite blocks which we crossed by jumping from one to another, guided by the stone pyramids set up here and there. The horses were pushed, pulled and hoisted along, performing acrobatic marvels, jumping, sliding, often stumbling and leaving blood-stains from their fetlocks on the stones. The yaks, on the other hand, proceeded slowly, methodically, but very sure-footedly; their cleft hooves, being bare, did not slip as the horseshoes did. The torrent roared beneath the stones. On our right we caught glimpses in the mist of the snouts and moraines of a series of small single glaciers stopping half-way down the slope.

At the point where we emerged into the larger valley we were met by a *yuẓbashi*[1] and the patriarchs of a shepherd camp farther down the valley. There was an exchange of greetings, and seven horsemen constituted themselves our escort. A little beyond, we came on a piece of felt spread on the ground beside the path, on which were set out refreshments—tea, milk, biscuits and fruit. The valley was covered with thick clay deposits and carpeted with grass like an alpine meadow; a number of yaks, with thick manes and long tails, grazed there with their calves. Descending from ledge to ledge we came to a level spot with several *akoi* near a little house, an enclosure for the flocks, made of *pisé* (dried mud), and the ruins of a fort. A third of a mile below was another similar encampment. The two *aghils* are called Khan Yeilak and Otmal Yagash, and are inhabited by a people different from the Kirghiz, with Caucasian instead of Mongolian features, rosy complexions, light eyes and great flowing beards. The men wear long quilted robes like the Kirghiz, but not red; they have white felt jackets, their legs are covered with white puttees to which leather soles are strapped. When they have on their heads caps of the same white felt, they look like millers. But the velvet cap is more usual, edged with fur, not pointed like the Kirghiz cap. The women do not wear the large Kirghiz turban, but a simple head-kerchief; they do not mingle with the foreigners. These are Pakpus, also called Tagliks or "mountain people," men of the Shiah sect, mostly nomad shepherds, with the exception of a few families who have settled and become tillers of the soil. They live in a region called Khalastan, which includes the upper basin of the Tiznaf and the adjacent part of the upper Yarkand, where they come into contact with the Kirghiz; but they are strictly endogamous.[2]

[1] That is to say the head of a hundred. *Onbashi* is the head of ten, *mingbashi* of a thousand. Then comes the *tuman aga*, head of ten thousand. It is the decimal system of the Roman military organization, first adopted in Asia by Jenghiz Khan, at the beginning of the thirteenth century, and it still survives in all the countries of Turkish descent, as far as Constantinople. On the decimal organization of the Mongol armies, see Yule's *Marco Polo*, 2nd ed., Vol. I, p. 253, and note to p. 256.

[2] See H. W. Bellew, *Kashmir and Kashgar*, p. 397; also the chapter by him and Chapman in Forsyth's *Report*, p. 61; and T. E. Gordon, *op. cit.*, pp. 113 and 133 *sqq.* Sir Aurel Stein suggests that these Pakpus or Pakpos are a group detached from the Tajik, who inhabit the great Sarikol region of the Pamir and constitute an ethnic link between the Iranian Sarikoli and the people of the Turkestan oases. (See M. A. Stein, *Ruins of Desert Cathay*; London, 1912, Vol. I, pp. 89 *sqq.*; and *Ancient Khotan, Detailed Report*, Oxford, 1907, pp. 25 *sqq.*)

Bellew describes the Pakpus as timid and suspicious. We found them friendly and easy to deal with. A fine old man with a flowing white beard told us that 5 of the 70 families composing this ethnic group were settled in this spot. Twenty of them came from the Raskam valley, driven out by the Kunjuts. He had helped in the construction of the modern fort of Bazar Dara twenty-five years before. As for the old Bazar Dara, whose ruins we had seen in the ascent to Kukalan Dawan, it had been deserted and in



Otmal Yagash, an *aghil* of the Pakpu tribe, in the upper basin of the Tiznaf.

ruins for three generations. Its existence dated from much earlier times than the existence of these people in the Raskam Daria valley.

The whole of the next day we proceeded down the valley, which is called Pakpu Dara. Despite the persistent grey autumnal weather, we felt unusually cheerful, probably because we had left the barren mountains and were once more in the haunts of men. The valley is dotted with small settlements, half camps, half permanent dwellings, and is alive with flocks and herds, horses with many foals, yaks and their calves, donkeys,

goats and sheep. There were also a few cultivated plots with a wall round them, near a little house with a threshing floor in front, and here and there they were harvesting the rye, while pigeons and gaily-coloured birds flew about. The formless houses look like the first attempts of nomads to adapt themselves to a permanent dwelling. They are rectangular, square or circular blocks, with mud walls so slanting that the houses

Group of Pakpus.

look like truncated pyramids ; a rude door leads into a single windowless room. The buildings all appear to be newly constructed. These people had once been scattered by Kunjut raids and then returned to their homes when the country was made safe once more. Near a group of houses we saw a cemetery which looked large enough to serve for the whole valley. It is full of Mussulman tombs, chiefly Sunni, around the tomb of a saint, decorated with poles, rags and yaks' tails. The place is called Sinewaldi, and bodies are brought thither from a great distance.

Large tributaries flow into the valley, with banks of clay and conglomerates at their

mouths; but the mist prevented us from seeing far into them; we barely caught glimpses of the succession of crests and buttresses, surmounted by spires and towers. The valley was green and spacious with beautiful large rose-trees in full bloom; now and again it narrowed for a little distance. We went down to within 9,000 feet above sea-level—it was about six months since we had been below 10,000 feet—and stopped at a place called Dudma Tag, a group of houses by two large willow-trees, inhabited by a few

Maẓar (tomb of a saint) at Dudma Tag.

Pakpus, who welcomed us with the usual hospitality in a room the floor of which was covered with *namdahs* and carpets, the walls plastered with clay mixed with shredded straw, and provided with little niches to hold the household goods. There was a hearth for the fire and a square hole in the roof for chimney. They offered us the usual simple presents of food and a bunch of daisies.

On a mountain shoulder a little above us was a much-venerated tomb, a heap of stones surrounded by a half-ruined wooden railing inside which was an untidy heap of wild rams' and goats' horns, with yaks' tails hung from a bundle of poles. The

uprights at the corners of the railing terminated in the shape of carved open hands, the "hand of Fatima," an ancient charm against the evil eye.[1]

Here the *beg* of all the Pakpus came to meet us. He lives at Karghalik, is appointed by the Chinese, and is in fact Chinese himself; tall and thin, with scanty moustache and thin hair on the chin.

At Dudma Tag several roads meet. Two leave the valley at once, crossing by different passes the spur between it and the valley where the main branch of the Tiznaf flows. A third continues down the Pakpu to its meeting with the Tiznaf. We took the middle way, mounting the spur by the Ishak Art or "Donkey Pass." We no longer had yaks in the caravan; having come down too low for them. A broad, steep, dusty path climbs a gorge which opens in the right side of the valley to a saddle in the crest of the spur, about 3,000 feet above the valley. By this, through a series of little valleys leading into each other, ending in short narrow rocky gorges, we reached the valley of the Tiznaf, a river of moderate size, and pitched our camp in a meadow beside it in the shade of some willow-trees. The sides of the valley were covered with conglomerates and clay. The fine dust of the desert, carried by the wind, was sprinkled on all the projections of the rocks, strippling them with light grey, like the appearance of sleet in the high mountains.

Wood and Spranger, with Petigax, arrived at this place 16 days after us, having crossed the Kuen Lun by the Yangi Dawan. From here on they followed our route, which soon leaves the Tiznaf valley, crosses the spur on its right and descends into the valley of Kök Yar. The pass is known as Ak-Korum or "white rocks," a name completely justified by the blocks of marble that fill the bottom of the small schistose valley leading up to it. We had a large escort, consisting of five *yuẓbashi* and a deputation that had come from Kök Yar to meet us. Almost at the top of the gorge we encountered a strange company: a Chinese official on horseback, in native costume, except for an old naval officer's cap with three stripes, and a sword in its scabbard attached to the saddle-bow; accompanied by a woman dressed in a jacket and skirt of black silk and a velvet cap, who at our approach hastily twined a long white veil tightly round her face and head. With them were two Chinamen in blue calico jackets, with great round pieces of white stuff covered with Chinese inscriptions on the chest and back; they were armed with old rusty guns, and one also carried a large curved wooden sabre with a red lacquered handle. The official was bound for the fort of Bazar Dara to collect taxes from the Kirghiz of the valley, and, expecting to find us still there, had brought us a crate of live fowls and a few dozen eggs.

Followed by our escort, we crossed the Ak-Korum between two clay hills, over

[1] This charm is very widely dispersed, and is to be seen on Phœnician tombs. It is common to-day in Syria, painted on the walls of Christian, Hebrew and Mohammedan houses. (See Dr. Rouse's note in *Jātaka Tales*, edited by H. T. Francis and E. J. Thomas, Cambridge, 1916, p. 153; also Sir E. A. Wallis Budge's *Amulets and Superstitions*, Oxford, 1931.)

a saddle 10,330 feet above sea-level, and came down the other side, raising large clouds of dust. We were received below by another deputation, also from Kök Yar, 25 miles away. We found ourselves in a wide dry valley bottom, covered by a thick layer of dust, where the vegetation consisted of tufts of long grass with hard stiff stalks. To right and left in the dim air were the rounded outlines of hills from which rose here and there a low tooth of rock. The camping-place is called Ak-Masjid or " the white

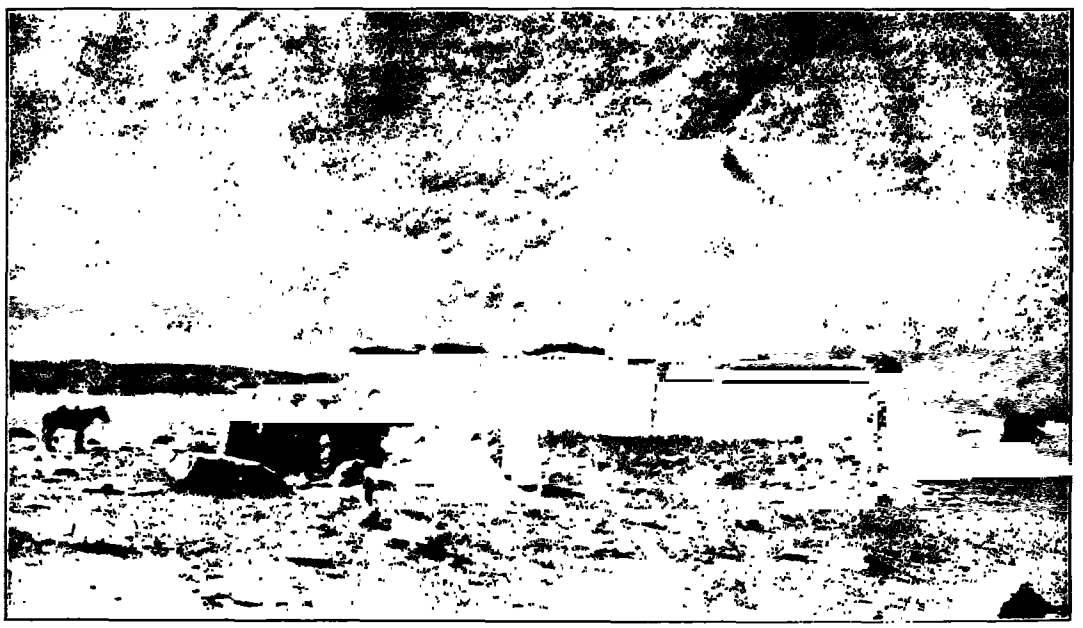
Upper Tiznaf valley.

mosque," but it was nothing but a *serai*, a rough clay structure near a well of muddy yellow rain-water which we had to use for drinking and cooking. In the evening around the light in the tent there were swarms of butterflies, moths, mosquitoes, and gnats. A file of camels had come from below to replace our pack-animals. Among them were several mothers parted from their young, who filled the night with mournful cries.

On September 22nd we continued down the wide valley. The uniformity and monotony of the plain greatly impressed us, accustomed as we were to the ever-changing scenery of the high mountains. The air was so thick that we could hardly see the disk

of the sun. The clay which covered the valley bottom was cut into deep furrows, at this season completely dry. Before us, between the lines of the low hills which enclose the valley, large dark shapes rose up in the mist which by degrees we found to be groups of magnificent trees, such as we had not seen since Kashmir, standing on the banks of the almost dried-up river-bed in the oasis of Psar. At the entrance to the village, on the grass under the thick shade of the trees, a meal had been spread out on felts, with peaches, melons, cucumbers, hard-boiled eggs, sugared almonds and tea.

As we came more and more into inhabited country these offerings—which are



The *serai*, Ak-Masjid.

called *dastar kwan* (literally "the table-cloth")—grew more frequent and abundant.[1] Each deputation had prepared refreshments on the ground, and the same ceremony was repeated in every village we passed through. The invitation was offered by an *on*—or a *yuẓbashi* or an *aksakal*, or some other personage—and we had to dismount and for politeness' sake at least taste the succulent fruit and sip a cup of tea. As soon as we had done honour to the *dastar kwan* at the entrance of Psar, we mounted again and went on 50 yards between the low houses of the village; then another group of men invited us to enter the house of a *yuẓbashi*, where the mistress of the house, unveiled, a handsome middle-aged woman, offered us a second collation, and did the honours

[1] The *dastar kwan* is an old native custom. Sir T. D. Forsyth (*Autobiography*, pp. 68–9) describes it and all its attendant forms and ceremonies.

of the house with courteous and easy dignity. Leaving Psar, we found ourselves among dunes of fine yellow sand, which seemed to stretch out interminably in the thick air. When the horses had trotted a good distance, we saw far away the foliage of two contiguous oases, Otansu and Kök Yar. While crossing the first we underwent two more receptions with the accompanying *dastar kwan*; then left it by a long avenue of jujube, mulberry, poplar, and plane trees, between ditches of water and fields of Indian corn and hemp. After another short tract of sandy desert we reached Kök Yar, a big village with well-built houses and some shops, the first place of any importance that we had struck since leaving the mountains.

Kök Yar lies almost at the edge of the great plain; to the north of it there still stretch the last offshoots of the spurs which form the sides of the valley, getting farther apart and gradually melting into the plain. The road, some 30 feet wide, ran along the large stony, empty river-bed, and was full of sheep and lambs being taken to fresh pasture, also of many wayfarers driving laden asses before them. All round us lay the yellow sandy desert, strewn with pebbles and stones: where eddies of dust would rise up, some very high, others only a few yards; they might be thick and dark, or almost translucent, moving slowly or very swiftly. I observed one which swirled round first one way and then the other. It is in this way that the fine dust is carried to great heights where it hangs like a veil in the atmosphere. When the sun was half-way up, the mirages began, and the oases we could catch sight of to the east, with their tall trees and masses of verdure, appeared like towns with large buildings, towers and belfries. A low dark line, that stretched before us like a bank of smoke, gradually revealed itself as the step of a flat terrace, into which the bed of the river ran; at the entrance to the little valley thus formed was a small clump of poplars and willows, with a group of tall trees, which gave the place its name of Besh Terek (five plane-trees). Close by was the *serai* and a pool of brackish water, full of moss and water-weeds. A spring of clear water was not far off, but it was even saltier. Our night was full of the barking and yelping of dogs, the braying of donkeys, and the endless chatter of human beings. Since we had entered Central Asia we had not heard a song or the sound of a musical instrument. These people are serious by nature, rather solemn and apathetic, quite different from the gay and thoughtless Baltis and Ladakis, who love music and dancing.

Between Besh Terek and Karghalik lay about 18 miles of road which we covered on September 24th. Rasul Galwan made himself smart, to present a good appearance in the city. He exchanged his Ladaki fur cap for a fine blue silk turban and put on a sky-blue *khalat* (robe of ceremony).

Nearly the whole distance was through a desert plain, without dunes; a fairly firm clay soil dotted with stones. From time to time we crossed small oases, with a few peasant houses, and at last found ourselves in a fine avenue of mulberry-trees, plane-trees, willows and jujube-trees, amid fields of hemp, Indian corn, various cereals, gourds, cucumbers and melons. We saw crowds of people intent on the hard work of lowering

the level of large tracts of land, removing great layers of soil in order to allow for irrigation and cultivation. They have to wage continual war against the rivers, which, when they overflow, deposit a silt that raises the level of the soil, while they lower their own beds by wearing away the clay. Without this unremitting labour any natural irrigation would become impossible in a few years.[1]

A few miles from the city, under some trees, a rich *dastar kwan* was prepared. The

Besh Terek.

ground was covered with *namdahs* in beautiful coloured designs, and pieces of printed cotton were stretched from tree to tree. On a low round platform our escort squatted on their heels in the Turki manner [1]; while in the centre stood a laden table and European chairs. We were welcomed by the *aksakal* of Karghalik with several other important townsmen. We made a brief halt for the usual interchange of courtesies, and

[1] Colonel Prejevalsky says that in the oases of the Khotan district, where the beds of the streams are at a low level, they get round the difficulty by elevated irrigation canals (see Prejevalsky's letters in the *Proc. Roy. Geog. Soc.*, Vol. VII, 1885, pp. 813–14).

[2] In Turkestan no one sits with the legs crossed, as is done throughout India and the two Tibets; they rest on their knees, leaning back on their heels.

went on into the heart of the oasis. At the entrance to the town we left the road and were conducted by several passages and courtyards to a large garden or fruit-orchard, full of peach, nut, apple, apricot, plum and mulberry trees, from whose branches drooped vines laden with luscious grapes. We put the best face we could on another reception, with an endless stream of fruit-laden trays; and pitched our tents in the largest avenue of this earthly paradise.

At Karghalik we had reached the great caravan route which skirts the southern edge of the Tarim; this was the route that Marco Polo took—eastward—at the end of the 13th century. The Tarim is the western part of the immense desert Han-Hai (Dry Sea) which stretches across the centre of the Asiatic continent for nearly 2,500 miles, with an average width of 400 miles. Lines of low hills divide it into two unequal basins: the eastern one is the desert of Gobi; the other or western one is 800 miles long by 370 miles wide, sloping slightly from the west (4,600 feet above sea-level) towards the east (3,200 feet) and surrounded by high chains of mountains. On the north is the Tien Shan range, on the west the Pamir, on the south the Kuen Lun and Altin-Tagh ranges. The desert which occupies this western basin bears the name of Takla Makan in its south-west part, and of Tarim in the north-east. This latter portion is crossed throughout its length by the river of the same name, which in reality is the lower course of the Yarkand, increased by its tributaries, the Cherchen, Khotan, Kashgar, and Ak-Su; while many other water-courses issue from the huge circle of mountains that surround the basin, and lose themselves in the sand before they have joined the larger river. The Tarim ends at the eastern extremity of the Lob Nor, an immense marsh without any outlet. On the margin of the desert, at the mouths of the mountain valleys, are the oases, the towns and villages of Eastern Turkestan, among which the largest and historically most important places are the towns of Khotan, Yarkand and Kashgar, to the south and west of the Takla Makan desert. Two caravan routes start from Kashgar to go round the basin; one to the north at the base of the Tien Shan mountains, to-day the usual route through Central Asia to China; the other to the south, by Yarkand and Khotan. This, the old route of the silk trade, was from the remotest times the commercial high-road between China and Mongolia and the empires of the West, Rome and Byzantium.

Eastern Turkestan is to-day, after a long and complicated history, the extreme western province of the Chinese Empire, under the name of Sin Kiang or New Province. It is a conquered country; the Chinese differ from the natives in race, religion, civilization and customs as much as the English do in India. Moreover, they do not take the trouble to learn the language, even superficially; and they live in separate towns, surrounded by high walls, which enclose the officials, the armed garrisons, and a small population of Chinese shopkeepers who provide for their needs.

The Governor-General or *Futai* resides at Urumchi, a town at the foot of the Tien Shan, near the eastern border of Turkestan. Under him are two provincial governors

or *taotai*, living at Ak-Su and Kashgar, various subordinate *amban*[1] or prefects of towns and smaller districts.

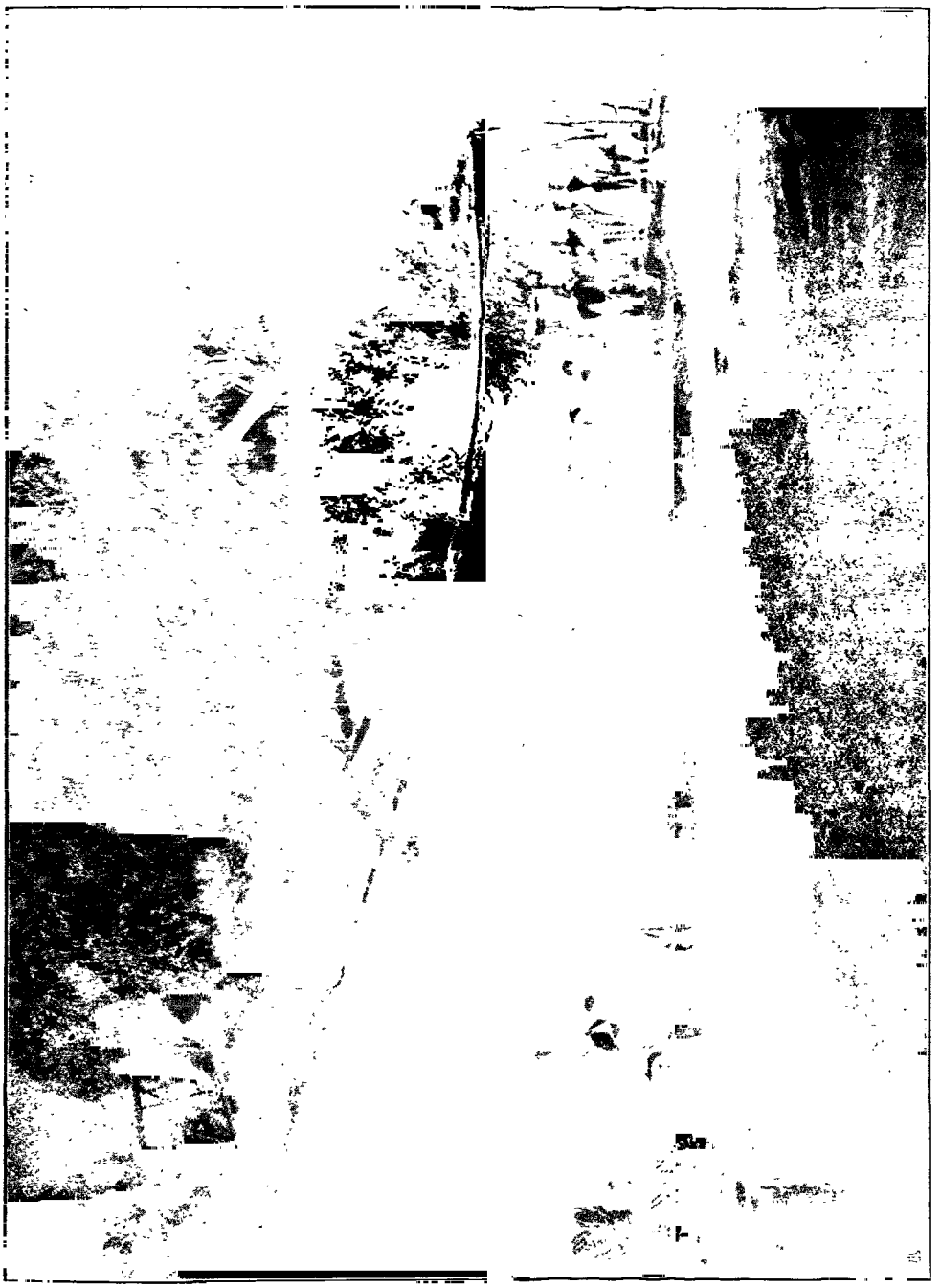
Karghalik is the seat of an *amban*, and there for the first time we met with the elaborate Chinese ceremonial etiquette. The day of our arrival, after having exchanged visiting cards and freed ourselves from the dust of travel, we mounted our horses again to pay an official visit to the representative of the Chinese Government.

Traversing a good part of the bazaar, we came to the entrance of the Residency, surmounted by a pagoda roof, and entered a big courtyard where we were welcomed by three gun salvos. Facing us was a low building, its walls covered by enormous painted dragons, relics of the Manchu dynasty, half-hidden by ugly red-paper placards. In the centre were large wooden doors with painted Chinese figures three times life-size. These doors gave access to a second courtyard, where we were received by the *amban*, a fine man, tall and slender, with his chief officials around him. They wore Chinese dress, except for an ugly European soft hat which they could not remove, because their pigtails were coiled inside it, being no longer orthodox in the new republic. Along the sides of both courtyards round, octagonal or horseshoe-shaped openings led to other open spaces with rows of trees. It was like a stage-setting, with open pavilions and galleries, and few real rooms. The reception took place in a small room with carved wooden seats placed round a little table with sweets and tea. In the little free space a crowd of people joined in the conversation carried on through two interpreters, one Turki, the other Chinese. The *amban* did not know, or did not choose to tell us, any news of the War.

We took leave, amid more volleys from the guns. We went back on foot through the bazaar, followed at a respectful distance by a train of inquisitive spectators. People seated in front of or behind their shops rose as we passed. The bazaar was the usual type found in all the cities of the two Turkestans, varying in size and wealth according to the importance of the town. The one at Karghalik was modest, occupying only a few unpaved streets; but those were well watered, and sheltered from the sun by trellises over which hung mats or the green shoots of climbing plants. On either side were shops containing all kinds of goods, including barbers' shops and any number of small native or Chinese taverns. Now and again a doorway or an alley opened into the courtyard of a *serai* where foreign merchants have their lodging and store their wares. Other streets are lined with trees, and ditches of running water. Swarms of flies and wasps, quantities of pigeons and sparrows, calves, sheep, donkeys, and vagrant dogs mingled with the bustling crowd; a great novelty to us was the sight of two little horse-drawn covered carts. We were amazed, like Marco Polo before us, by the very large number of goitres.[2] Many people, also, were pitted with small-

[1] W. Woodville Rockhill (*Land of the Lamas*, p. 51, note) says that *amban* is a Manchu word, equivalent to the Chinese *Ta-ch'en*, or Minister of State.

[2] See Yule's *Marco Polo*, 2nd ed., Vol. I, p. 159.



Street in the bazaar, Karghalik.

pox. The women mixed freely in the crowd, unveiled, but ran and hid at sight of us unbelievers or pulled down over their faces the big white veil that covers the head under a round embroidered cap. Neither men nor women wore jewels or ornaments; but several women had a large black streak painted across the eyebrows, which made them look as though they were scowling; others, evidently prostitutes, had made-up faces and impudent manners. There were a great many babies, naked children and small boys, who constituted themselves an admiring escort to our Ladaki coolies. There were a good number of Chinese men, with or without pigtails; but only a few

[*Phot. Spranger.*

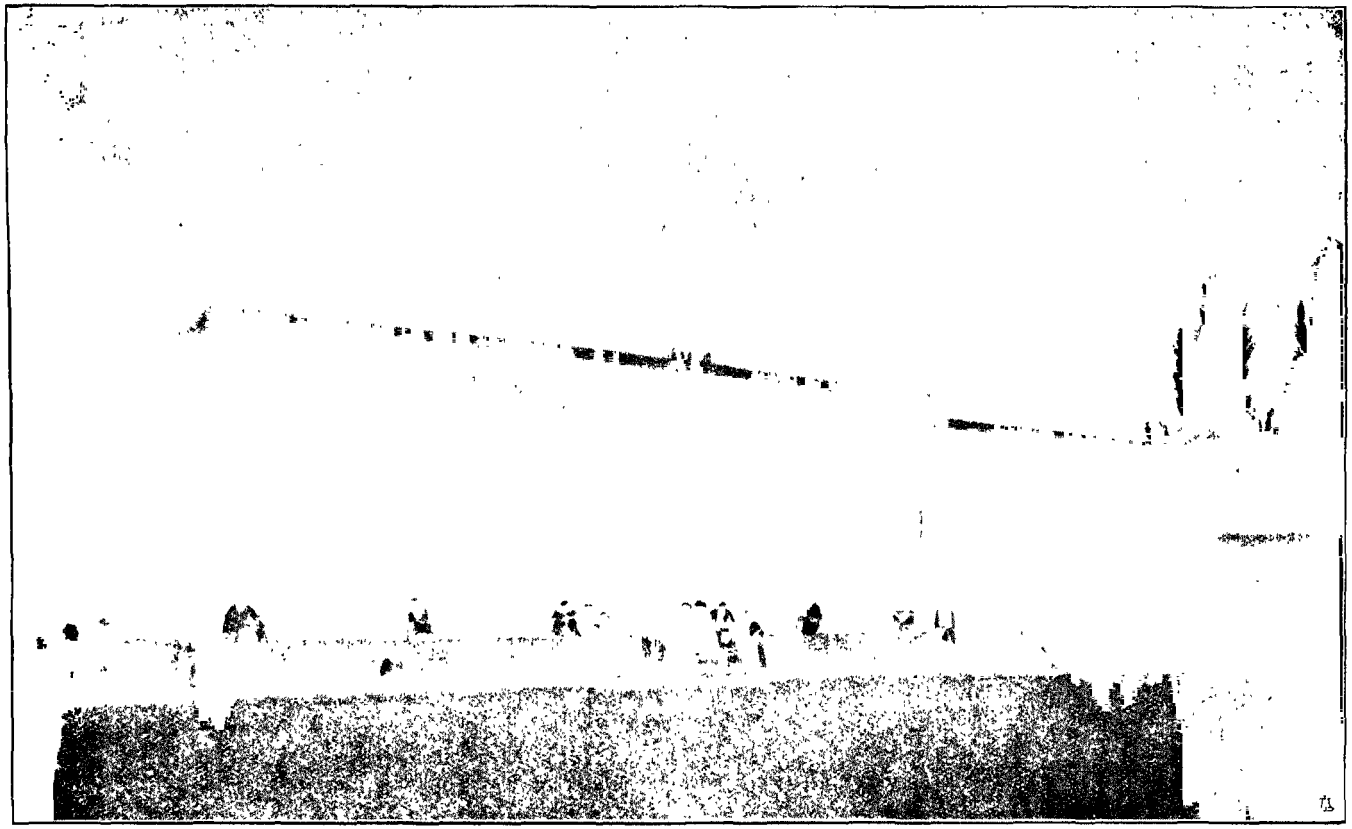
Paper factory, Karghalik.

Chinese women—at least we only saw one. She had her feet bound in the Manchu fashion, and stood with two sinister-looking men at the door of a tavern from which issued a sickening smell of bad brandy. The bazaar is in full swing only on Mondays, which is market-day in Karghalik.[1]

There were separate quarters for the various trades; farriers, blacksmiths, fullers of the plain or coloured felts called *namdah*, and people engaged in spinning the silk from the cocoons with an ingenious wooden machine, or crushing olives in primitive mills turned by an ox inside the house. In an outlying field there was a paper factory, not for fine Chinese paper but a coarse sort made from the bark of the mulberry-tree.[2]

[1] Every city in Turkestan has—as in many places with us—one market-day in the week.

[2] See A. Deasy, p. 341, for a detailed account of the manufacture.



The Grand Mosque, Karghalik.

The houses of the town are one-storied, built of sun-baked bricks, without ornament or architectural design. On the other hand, many of the flat, terraced roofs were decorated with boxes of flowers. We were invited to go into the house of the *aksakal* [1] of Karghalik where we made a short stay; and here at last a proclamation in Turki issued by the British Consul-General of Turkestan was translated to us and we learnt of England's participation in the European War. The news only increased our anguish of uncertainty about the decision of Italy.

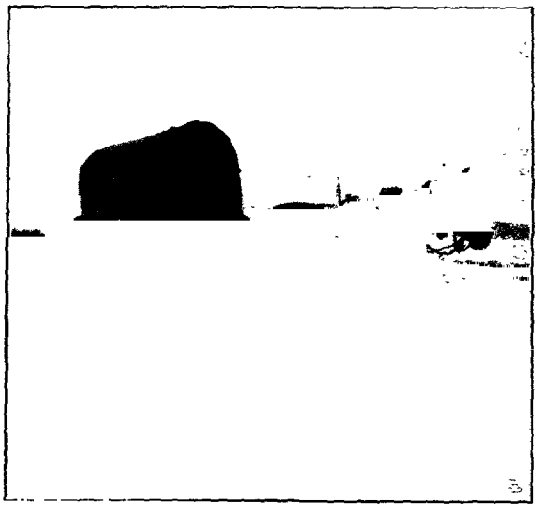
In the middle of the bazaar was the principal mosque, a low building on a large quadrangular base, with an open portico occupying the height and breadth of the façade. Adjoining the bazaar was a quarter of Chinese houses; the private house of the *amban* and his family, a school, and a group of religious buildings consisting of large rooms like separate chapels built round courtyards; empty and bare save for small boards covered with inscriptions set upon a bench. The courtyards were vegetable gardens: and in one of them were two cages containing two puppets and two wooden horses of rude workmanship. Everything was dust-covered, deserted and shabby.[2]

On returning to our tents, we found we had been preceded by presents from the *amban*: a sheep, two sacks of rice and three large bundles of wood for fuel. The next morning he returned our visit, and invited us to a ceremonial dinner at the Residency in the afternoon. It was a banquet indeed—twelve courses, of several dishes each. There was pork, mutton, and chicken, cooked in different ways, very tender, even the bones and claws of the fowl being so soft that they could be eaten. There were preserved ducks' eggs many years old, vermicelli, different kinds of dried fish and cuttlefish; for vegetables, the leaves and seeds of the lotus, the heart and roots of the water-lily, seaweeds, bamboo shoots and always, with everything, boiled rice. The meal began with sweet pastries and ended with rice broth, following the Chinese custom of doing everything upside-down. The food, excellently prepared and pleasing to our European taste, was served in big bowls, divided into small pieces so equal and symmetrical that they might have been cut with a machine. Each person helped himself with small ebony or ivory chop-sticks. Fortunately we were given European knives and forks. We had before us tiny little plates and cups and bowls like a doll's tea-set, into which were put sauces, salted almonds and pumpkin seeds. Tea was served, and a kind of perfumed brandy in a little cup the size of a thimble. Between the courses everybody smoked, we cigarettes and the Chinese diminutive metal water-pipes, holding so little tobacco that they barely gave a mouthful of smoke.

[1] *Aksakal*, or greybeard, in other words an old man. He is a sort of elected justice of the peace; every guild has one; there is one for transport, for silk, for *namdahs*, etc., and one as a head over all, who is called the *aksakal* of Karghalik, of Yarkand etc. Likewise the various foreign colonies and groups of individuals who have assumed foreign citizenship, English or Russian, have their own *aksakal*, officially recognized with consular functions.

[2] For further details on the population of Chinese Turkestan see Bellew's and Chapman's chapter in the Forsyth *Report*, pp. 80 *sqq*. The Turkestani are to-day a mixture of tribes and races of the two

We took the road again on September 26th, and at last we travelled in a carriage or, more accurately, in a *mafa*, the local springless cart, with two high wheels, the rims of which were studded with large protruding nails which made them look like cog-wheels. The *mafa* has a hood of stretched canvas, closed in the rear. We piled our rolled-up sleeping-bags inside to sit on. But it was pleasanter to sit in front, with our legs dangling, and enjoy the scenery. The driver sat on the shaft where it joined the body of the cart. There were no reins; the horse, decorated with a large collar of bells, is guided by the voice and whip.



A *mafa*.

Outside Karghalik the road proceeds northward, veering slightly towards the west. It was very wide, covered by a thick layer of dust, except for short stretches near the villages, where it had been watered. There are many dyked ditches, over the largest of which rough bridges have been thrown, made of two beams resting on the banks, with other beams laid transversely upon them. There was a coming and going of people riding horses and asses. The women all had their faces exposed, although many wore the white veil turned up under the cap. Here and there on the edge of the road ragged beggars, blind people and lepers stood and asked for alms. From time to time the drivers sang some almost rhythmless tune in a hoarse unmusical voice, interrupting themselves to extract from a small gourd a pinch of tobacco in green grains, which they put in the mouth under the tongue.

The road is measured in *fotai* or *fote* (between $1\frac{3}{4}$ and $2\frac{1}{2}$ miles),[1] marked

great Asiatic families, the Turks and the Tartars. They speak Uighur, a Turki dialect. They are mentally and physically degenerate, with very slack habits and given to the use of hashish and opium. The authors cited give details of their civil and religious customs and of their family life, of education and the colleges or *medresse*, in which theology, law, medicine, poetry and history are taught. Further information on Turkestan under the present Chinese government and an excellent bibliography, may be found in *Chinese Central Asia*, by Henry Lansdell, London, 1892, 2 vols. The latest books are *Through Deserts and Oases of Central Asia*, by General Sir Percy Sykes and Miss Sykes, London, 1920, the second part of which deals with the geography, ethnology, commerce and history of the country; and *Chinese Central Asia*, by C. P. Skrine, London, 1926. Both Sykes and Skrine succeeded Sir George Macartney as Consuls-General in Eastern Turkestan.

[1] The Chinese measure of distance is the *li*, somewhere about a third of a mile. But it is a measure of time rather than of distance; *li* in the mountains differ in length from *li* in the plains, and

by regular monuments. It is shaded by mulberry, poplar, plane, nut, and willow trees, and for long distances reminded us of our Italian country roads over the plains, especially of those in Lombardy, the Emilia and Romagna. But in Turkestan the cultivation is rather more irregular, though quite as luxuriant: there are fields of rice, maize, wheat, barley, millet, cotton, flax, tobacco, hemp and vegetables.[1] In this stage we crossed only two settlements, neither of them very large, with the bazaar closed and deserted, because it was not market-day. The cemeteries were numerous and large, full of common graves with perhaps the tomb of some saint roofed over and surrounded by a fence, but without the usual poles, votive rags, horns and tails of animals. Some 12 miles from Karghalik we reached the Tiznaf river, a small branch of which runs in one bed, the rest being dispersed over the plain in innumerable stagnant pools. A little farther on it disappears altogether. After another 12 miles or so, we reached the little town of Posgam, where we lodged in an ancient mosque turned into a rest-house for officials on tour. It contained a few rooms, empty and bare except for a high staging of masonry which served as a bed. They had laid carpets and felts on the floors for us.

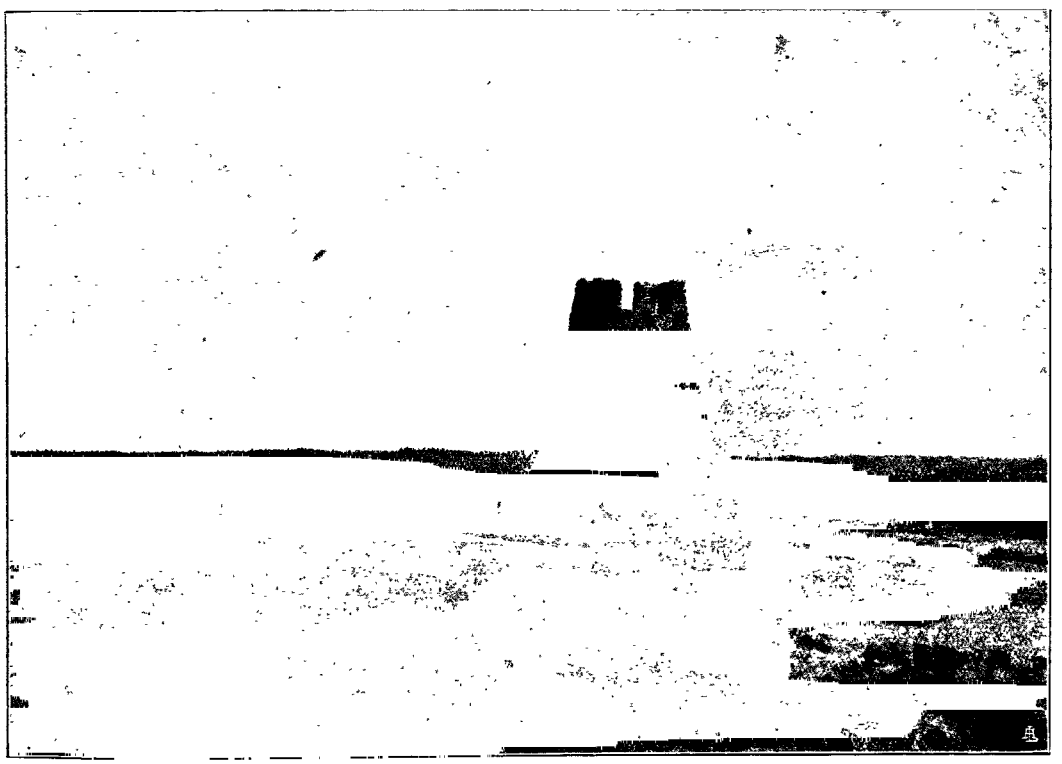
The stage between Posgam and Yarkand is much shorter than the previous one, but one loses a lot of time crossing the Yarkand river, which here in the plain is called Zarafshan or " scatterer of gold " on account of the prosperity brought by its waters. There are really two ferries, the river being divided into two branches, encircling a stony, sandy island which is probably covered at high water. At this season the two branches together were perhaps 260 yards wide,[2] and we crossed them in turn on ferry-

they also vary according to the grade and the difficulty of the road and whether one is going up or down hill (see E. Colborne Baber, " Notes on the Route followed by Mr. Grosvenor's Mission through Western Yunnan," *Roy. Geog. Soc. Suppl. Papers*, Vol. 1, 1882–5, p. 161, and I. Bishop, " A Journey in Western Sze-Chuan," *Geog. Jour.*, Vol. x, 1897, p. 19). The same holds good of the modern Persian *farsang* or *barsak*; and probably of the Mesopotamian *parasang* at the time of Xenophon. Shaw (*op. cit.*, p. 475) mentions a unit called *tash*, likewise a time measurement, which in stages on the plain is about 5 miles.

[1] The oft-cited chapter by Bellew and Chapman in the Forsyth *Report* contains some interesting details about the customs and organization of Turkestan, which have been fundamentally the same since the time of its reconquest by the Chinese. The agricultural population is scattered among the farms. Every family has its own house (*oë*), and these, either isolated or in groups of two or three, stand along the water-courses for irrigating purposes. A group of sixty or eighty houses forms a *mahalla*, with an *aksakal* at its head. The distribution of the water supply is regulated by a public official called *mirab*, who apportions it among the *aksakals* of the several *mahalla*. A certain number of *mahalla* makes a *yaʒ* or village, and two or three or more of these have a *kand* or capital, the residence of the officials, the principal merchants, the artisans and the site of the bazaar, which is held once a week, when the peasants come to exchange their goods for supplies from the town. Every *kand* has its mosque, its school, and an inn or *serai*. See also Lansdell, *op. cit.*, Vol. 1, pp. 466 *sqq.*

[2] The Yarkand river evidently varies greatly in volume; still, it is hard to reconcile the discrepancies between the accounts of various travellers, on the subject of its size at the crossing a few

boats and barges large enough to embark carts, horses and men. On the banks, which were covered with tamarisk bushes, a motley crowd with saddle- and pack-animals awaited their turn to cross. There was, of course, an *aksakal* of the ferry, who offered us a repast of peaches and melons, the first of a series of *dastar kwan* to which we had to submit, proffered by the notables of the villages, probably at the instigation of the *amban* and the *aksakal* and a delegation of British subjects from Yarkand who had come



A *fotai*, or milestone, in Chinese Turkestan.

to meet us. The *aksakal* had brought saddle-horses to add to the impressiveness of our entry; we were thus able to quicken our pace and in a short time we saw among the trees the high battlemented walls of Yarkand. Lodging was ready for us in a

miles from Karghalik. Lansdell has collected some of these. Forsyth asserts that in the summer the Yarkand fills its entire bed, which is about a mile wide; whereas Henderson says that it is from 80 to 200 yards wide at high water. Another traveller judged it to be 450 yards wide in August. Lansdell himself, in September, found it divided into several channels which were easily fordable, save one, where a ferry was used. (See Lansdell, *op. cit.*, Vol. II, pp. 137 *sqq.*, where he also speaks of the fish, gold and jade to be found in the river.)

suburb outside the southern gate of the city, in a small house standing in a garden. Its rooms were newly decorated in light blue, and the floors were covered with soft carpets. A large table was laden with fruit, sweetmeats and the usual tea. In a near-by building were three rooms suitable for the gravimetrical station, and in the garden among the trees there was space enough for the astronomical observations.

As at Karghalik, we at once paid a formal visit to the *amban*, mounted on very

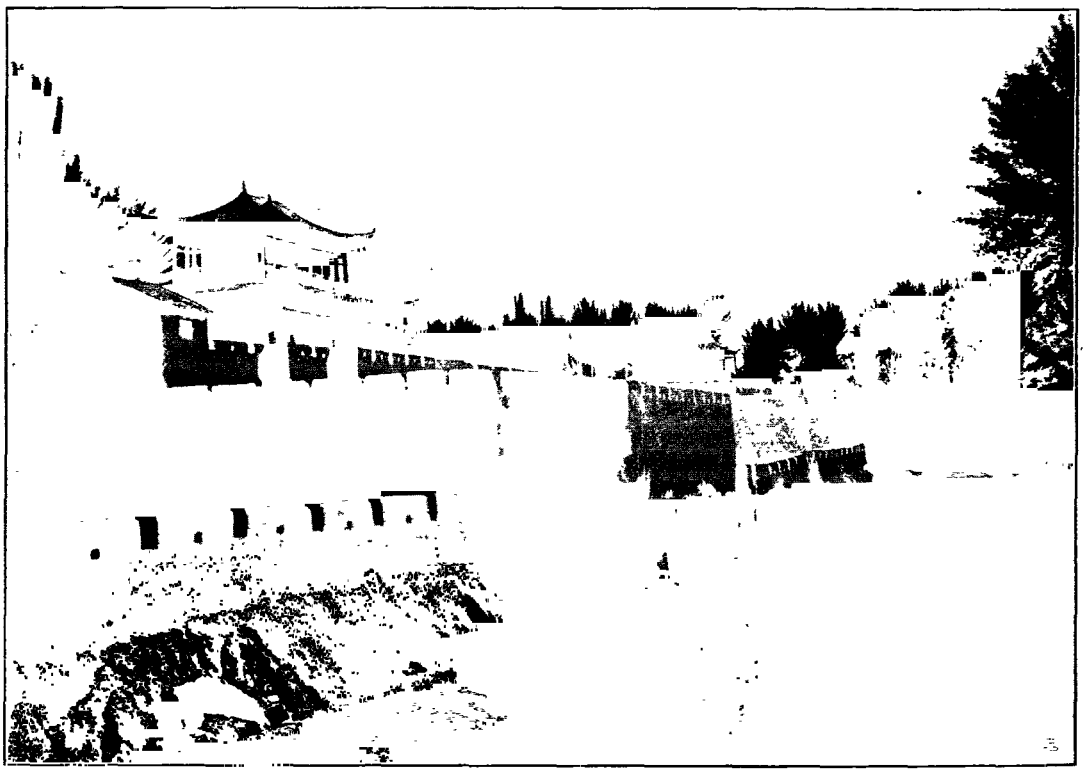
Ferrying across the Yarkand river.

fine Yarkand stallions. No one of any standing in Turkestan would ride a mare, which is regarded as a beast of burden, and used only for breeding, drawing carts or butchering.[1] We crossed the Turki town or Kohna Shahr (old town), then a road lined with shops which led us to the Chinese Yangi Shahr (new town). It is squarely built, surrounded by imposing walls, with stout towers at the corners, a moat, parapets and battlements, all made of *pisé* or dried clay. There is a double gate, with a guard-room occupied by Chinese soldiers, armed with medieval halberds with blades of varied

[1] Horseflesh is more esteemed in Turkestan and fetches a higher price than beef or mutton.

Wall of the Yangi Shahr, Yarkand.

shapes, like sickles, hatchets, lances, etc. A wide road cut across the middle of the Chinese city, with provision shops, kitchens and taverns much larger and better equipped than those of the native bazaar. The Residency was of the same type as the one at Karghalik, but with larger rooms. The *amban*, however, was the direct opposite of his colleague: a small, round-faced man, cautious and reserved, without a trace of the other's spontaneous geniality. At the usual tea-table we were subjected to a regular cross-examination: from what country had we come, and why, how long



Gate at the Yangi Shahr.

were we going to remain here and what were we doing, where going, etc.? He was evidently greatly impressed by our mysterious means of communication by wireless, of which he had heard something, and he even asked for our passports, which had been duly stamped and *viséd* by the Chinese ambassador at Rome.

On leaving, ceremoniously accompanied by the *amban*, at the close of the audience, we found a crowd of Turkis gathered in the second courtyard. At his approach they knelt down, while one presented a piece of paper which was received by an official. And when we had mounted our horses and were leaving the Residency,

we heard behind us the shouts of a mob. Some troubles are common to all countries.

We sought out the Chinese post-office, and found it closed and deserted. Only after much insistence were we taken to a room where we ruthlessly disturbed the opium-dreams of the head official, a wretched creature, very thin and wizened, with watery eyes. He rose painfully from a low canopied couch on which he was lying near his little pipes, a lighted lamp, and the tell-tale little sticks. We supported him into the office to make sure that there was no mail for us.

On leaving the Yangi Shahr, we visited the Swedish Evangelical Mission, situated between the two towns. It numbered five missionaries, three men and two women, from whom we at last obtained some news of the War, though so fragmentary and uncertain that it left us more puzzled than ever. Yarkand is the largest town in Chinese Turkestan, of which it was once the capital, and extends beyond its walls in large and populous suburbs.[1] Forsyth and the members of his two missions described it under the rule of the Atalik Ghazi as a clean well-ordered place, bright and prosperous, with taverns better than those of Stambul, in which an excellent meal was obtainable.[2]

We did not get so favourable an impression. The town contains no building or monument worthy of note. The mosques and the *medresse* (seminaries or theological schools) are plain and unadorned, without minarets or any trace of the architectural beauties and elaborate facings of coloured tiles which are the ornament and glory of the towns of the other Turkestan, such as Bokhara and Samarkand. The chief buildings are the Friday Mosque, dedicated to the conqueror Yakub Khan (the Atalik Ghazi) which has a high portico supported by wooden pillars with carved and painted capitals, and the *medresse* Abdullah Khan where 50 or 60 *mullah* are lodged. The greater part of the town is taken up by the bazaar. The streets are almost everywhere covered, and are watered every Thursday, market-day. The bazaar is divided into quarters for the various goods which consist of cheap wares for common use, with nothing of any artistic value such as jewellery, wrought metals or rich materials. The houses are low, most of them only one story, and made of mud bricks. A number of water-tanks are scattered about, surrounded by clumps of trees. The population is poorly clad, without ornaments; a good half of them are goitrous, as at Karghalik. The numerous beggars are a professional class, and public charity not merely provides for them but maintains prisoners as well, although in theory these are

[1] Shaw (*op. cit.*, p. 459) in 1872 believed the population of Yarkand to be at least 75,000; Forsyth gives it less than half that; Bellew and Chapman, in their chapter in the *Report*, p. 36, reduce the figure to 20,000.

[2] At that time slavery still existed in Turkestan; it was abolished in 1897. In the four years previous, 1893–7, more than 2,000 slaves were freed by the zeal and activity of Sir George Macartney, the British Consul-General (see H. H. Deasy, *op. cit.*, p. 339).

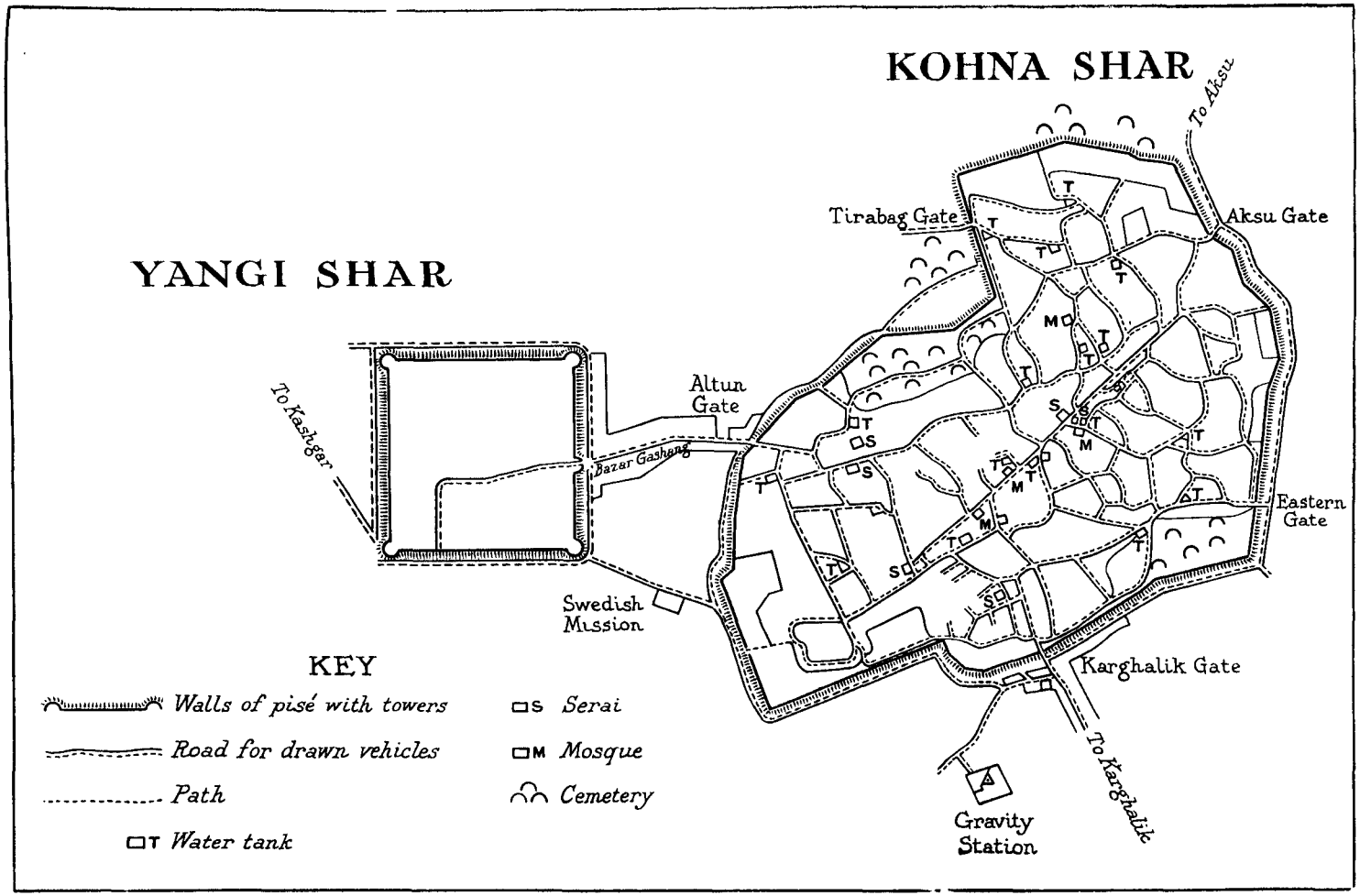
fed by the State. In the bazaar we saw a man who had been sentenced for theft. He was naked but for a rag round his loins, and fastened to a pillar by a long thick chain attached to an iron collar round his throat. A young girl with a pitcher was pouring water on his arms and chest, to wash them : a scene moving in its simplicity, that might

Criminals in the stocks.

have come out of the Bible. The Chinese have also introduced even more cruel uses for the pillory.[1]

The annexed plan made by Jamna Prasad and Shib Lal gives a clear idea of the size and shape of the two towns, the native and the Chinese. The five gates

[1] Our impression may have been a superficial one, due to too brief a stay. Sir Aurel Stein speaks of the flourishing trade and the prosperity of Yarkand, attributing them to its situation ; the Khotan, Ladak, Oxus (Pamir) and Kashgar roads all meet there, and among its inhabitants are people from the most diverse countries (see *Ancient Khotan*, Vol. I, p. 87).



Plan of the city of Yarkand.

of the native town are shown, the cemeteries, the principal reservoirs, the various *serai*, warehouses and resorts of those who come into the town on market-day.

We stayed fourteen days at Yarkand, from September 27th to October 11th. I said in the last chapter that I had arranged for the scientific instruments to be transsported from Suget Karaul by the ordinary caravan route. They arrived at Yarkand six days after us, on the 3rd of October. In the meantime we had been looking for a boulder to serve as the basis for the gravimetrical apparatus—a difficult matter in a region where there are no stones larger than one's fist. Rasul Galwan solved our difficulty by discovering a disused mill-stone in a garden, and with the help of all our men we succeeded in moving it, rolling it like a wheel to the little room chosen for the station, and fixing it in the ground.

The Chinese watched these strange proceedings uneasily, and armed soldiers even tried to prevent us from moving the stone. I should say that in this far-off province, on which both the Russians and the English have had an eye for many years—the former from Tien Shan, the latter from the Karakoram—the Chinese Government, whilst tolerating their commercial activity and profiting thereby, is most suspicious of all geographical research, in the quite reasonable fear that it may be a prelude to more direct interference. I had been warned by the British Consul of Kashgar and the Italian minister at Pekin not to give the Chinese authorities a hint about our work. But it was unthinkable that in an Eastern country, where there is no sort of privacy, we should be able to conceal our researches, which involved the setting up of astronomical, magnetic and gravimetric apparatus, a wireless station with 450 yards of aerial, and observations carried on by day and night. It seemed in every way the best policy to do things openly, and we invited the *amban* to come and see our scientific installation. He came in state, in a *mafa*, flanked by two Chinese guards. Two more, on horseback, acted as outriders, and a third man went before the vehicle holding high an open red umbrella. We made the Governor look at the chronometers, the barometers, the telescopes, the magnetometers, the pendulums of the gravimeters, the wireless receiving apparatus, etc. He asked us if we could see in the stars what was happening in Europe, and other things of the same kind, displaying an intellectual grasp immeasurably inferior to that of the *kushok* of Himis. Finally he left us with more cordiality than he had hitherto shown, even though not entirely reassured about our operations. He, too, gave us a banquet in the open pavilion in the Residency garden, with viands even richer and more elaborate than those of the dinner at Karghalik, and we exchanged presents. In fact we all ended by being on excellent terms.

The work of the station went on regularly in spite of the drawback of the cloudy skies. We received very distinctly the wireless time-signals from Lahore, and were able to determine exactly, for the first time, the longitude of

Yarkand, about which the data given by former observers were not at all in agreement.[1]

One day during this period will remain for ever in our memories: the 30th of

The *Amban* of Yarkand on his way to visit us.

[1] The same holds good for Kashgar. The situation of these two important cities of Turkestan has been the subject of long discussions and a series of articles in the papers of the Royal Geographical Society, which I need not cite here. But it should be noted that there is almost perfect agreement between the longitude of Yarkand determined in 1873 by the native surveyor Krishna (Kishen Singh) attached to the second Forsyth mission, that is, 77° 15′ 55″, with the figure of 77° 15′ 46″ obtained by wireless by our expedition (see Captain H. Trotter, "Account of Survey Operations in Eastern Turkistan (1873–4)" in *Records of the Survey of India*, 1915, Vol. VIII, Part I, also the discussion of our results and the data for our observations by Giorgio Abetti, *Relazioni Scientifiche*, Vol. I, Series I). I may add that in the long interval between the date of the expedition and the publication of the *Relazioni Scientifiche*, various articles have been published in periodicals or in the publications of the Survey of India, giving our geodetic and topographical data with reference to this or that place. Some of these differ, almost always within the limits of possible error, from the results as ultimately calculated—this has special reference to longitude values. Those which appear in the *Relazioni Scientifiche*, Series I, are to be considered as final, superseding all others.

September, when at last, by way of Gilgit and Kashgar, the longed-for mails from India reached us, the first since those we had received on the Depsang plateau. They arrived towards six o'clock in the evening. There were letters from Italy, news of our companions who were on their way home, of Wood and Spranger then in the desert solitudes of the upper Yarkand, and newspapers up to the 21st of August, with a bundle of Reuter's *communiqués* from the beginning of the War to the first of Sep-

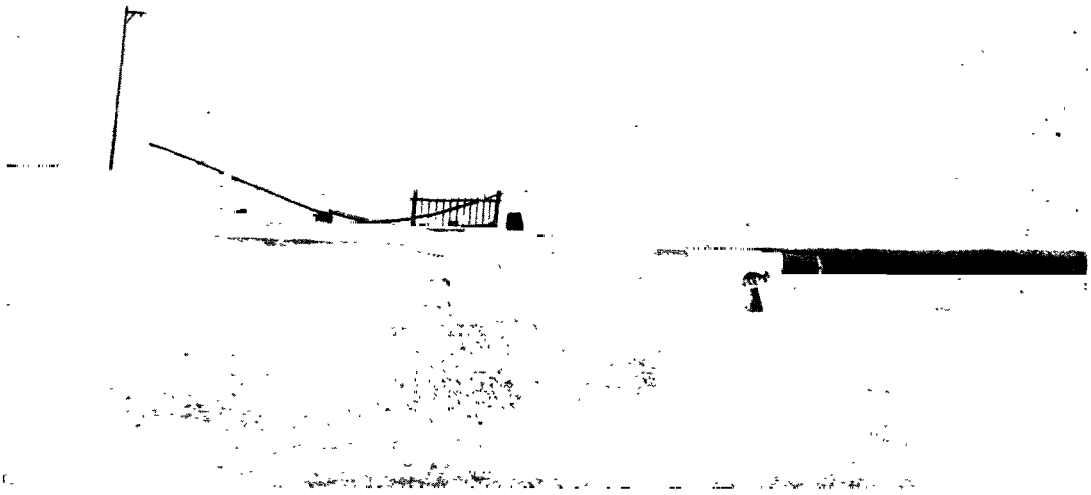
Road between Yarkand and Kök Robat.

tember. We glanced at the home letters, and then started to read the European news. We resisted the temptation to look at the last communications first, so that we might lose nothing of the dramatic course of events, and began reading aloud, with frequent reference to the maps in *The Times*. It grew dark, but we continued by the light of the oil lamp, without a thought of dinner, and we did not stop until we had come to the end, at half-past one in the morning.

The distance between Yarkand and Kashgar is about 125 miles, which we covered in five days, between the 11th and the 15th of October. Our baggage, once more complete with the scientific outfit, was loaded on the Central Asian carts or *araba*,

drawn by three horses side by side. On our arrival at Yarkand, we had been greeted by the English *aksakal*; on our departure it was the Russian *aksakal* who bade us farewell and accompanied us, together with a troop of Indians, for some miles, as far as a tent where the inevitable *dastar kwan* was prepared. The *amban*, besides the usual *chuprassi*, had given us as escort an unarmed Chinese soldier who looked like a gallows-bird, and wore a uniform of every colour under the sun.

The route runs along the oases, on the edge of the desert, and the beauty of



Ak Robat.

the autumn colouring helped us to bear the scorching heat of the sun. Towards the west a chain of hills was outlined in the dusty air—they were the fringe of the Pamir. Later, while we were crossing a stretch of oasis the sky was suffused with a golden sunset. From every alley little donkeys laden with maize and people and animals returning from fields or pasture poured out into the road. We made our halt at Kök Robat, settling best we could in the courtyard of a *serai*, given up to us by three merchants who had arrived before us. The two following stages were in the desert, a boundless flat plain, yellowish in colour, strewn with gravel and stones, with occasional streaks and patches of brown or green formed by tufts of a thorny plant. The

road was very wide, but even so not wide enough for the drivers, who let the carts stray to and fro over it. The yellow pyramids of the *fotai* stood up in the distance. We passed through Ak Robat, a simple enclosure between walls of *pisé*, by a well some 100 feet deep; and went on to Kisil Bazar, a wretched village in a small oasis, where we bivouacked in an empty courtyard. There was no running water, only a large cistern for the needs of the settlement.

Kisil Bazar.

Just outside Kisil Bazar we passed a huge cemetery, with several monumental tombs. We were in the district of Yangi Hissar, full of ruins half-buried under the moving sands. Among these ruins are the tombs of several Khans and Bibi (warrior queens) who fell in the struggle between the Buddhists of Khotan and the Mohammedans [1] that lasted for quite a quarter of the eleventh century.

A light breeze lifted the desert dust in small eddies which rose straight up like the smoke of bonfires. We crossed large tracts of dried-up marsh covered by a hard crust

[1] See the historical references in the next chapter. Bellew speaks of these tombs in Forsyth's *Report*, p. 37, also Lansdell, *op. cit.*, Vol. II, pp. 74–5.

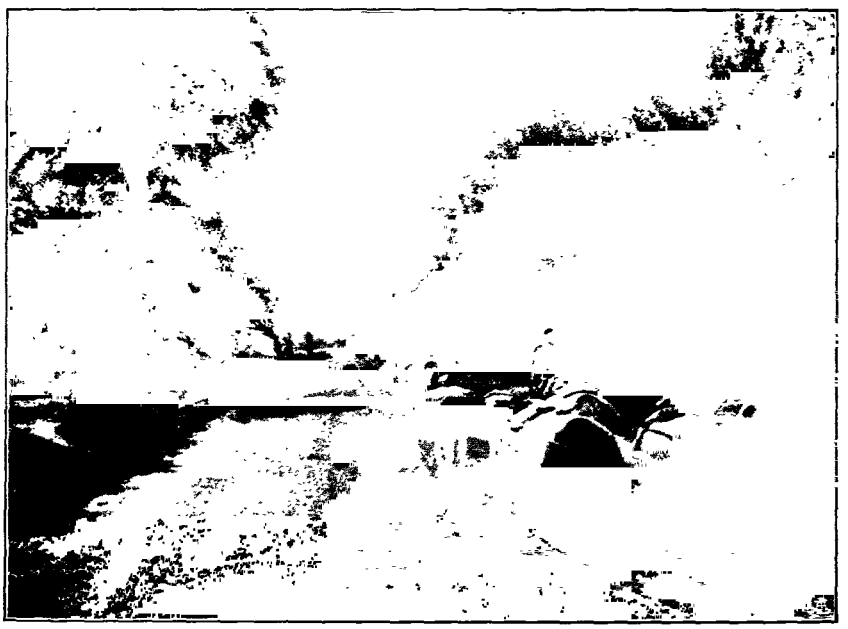
from which sprang small dead reeds. At no great distance towards the west the farthest spurs of the shoulders of the Pamir ended in a line of low ridges along the road. This was the region of the Shana river, which after issuing from the mountains divides into innumerable branches that wander into the plain and are lost.[1] We crossed the chief of these, called Saigan, by a wooden bridge high above the river, which here flows enclosed between clay banks.

Bridge over the Saigan.

A little farther on we met envoys from Yangi Hissar (New Castle). The Indian *aksakal* and the Russian one and various important people came to meet us, and did

[1] Shaw speaks of this behaviour on the part of the rivers of Central Asia. They spring from innumerable streams and tributaries in the mountains, then they have a longer or shorter course in the valleys whence they emerge into the plain ; there they are dissipated into a large number of branches which wander through the desert. The rate of evaporation is, of course, greatly increased in the process. He counted eight rivers in the neighbourhood of Kashgar, all coming from one main stream, the Kizil Su ; and five principal watercourses between Yapchen and Kashgar likewise belonging to a single river (see Shaw, *op. cit.*, p. 459, and his article " A Prince of Kashgar," etc., *Jour. Roy. Geog. Soc.* Vol. XLVI, 1876, p. 285.

the honours of the *dastar kwan*; we accompanied them into the town, where we were received at a Chinese rest-house, like the one at Posgam. A few minutes after our arrival, the *amban*, on horseback, with a small escort, came to give us a ceremonial welcome, and after a few hours we returned the compliment at the Residency. Evening had fallen; in the bazaar, lit by oil lanterns hanging on poles, a few fruit-shops were still open, filled with the soft light of oil lamps with wicks, exactly like Pompeian ones. Beside the native town is the Chinese fort, where the *amban* welcomed us, and politely pressed us to stay a day or two. But that was not possible. He sent back with us two Chinese who carried big paper lanterns hanging from long poles.[1]



On the road between Yangi Hissar and Yapchen.

Leaving Yangi Hissar on the morning of October 14th, we were at last for a few hours in a sufficiently clear atmosphere to be able to see to the south-west the glaciers of the great Kashgar range, which encircles to the east the Sarikol plateau of the Pamir with the great peaks Kungur (25,100 feet) and Mustagh (24,390 feet).[2] By little oases, stretches of desert and wide tracts of marsh with brackish stagnant water, we reached the village of Yapchen. Beyond Yapchen, in the last stage, the road is much worse, full of holes and ups and downs, pools of water, large and small ditches and broken

[1] See the description of Yangi Hissar in Lansdell, *op. cit.*, Vol. II, p. 66.

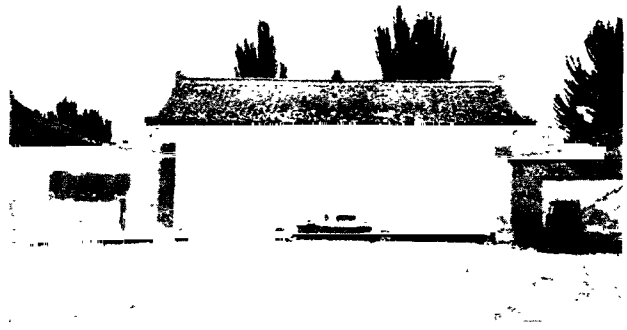
[2] See the important exploration of the Kungur massif in Skrine, *op. cit.*, and in *Geog. Jour.*, Vol. LXVI, 1925, p. 386.

bridges. We crossed only two watercourses, of moderate size. Yangi Shahr, the fortress and Chinese town of Kashgar, is about 6 miles from the native town. It is surrounded by high battlemented walls, even more massive and imposing than those of the Yangi Shahr of Yarkand. Lansdell says it is the principal fortress of Chinese Turkestan, built in 1838, the residence of the General commanding the military district which extends to Khotan, with an arsenal of artillery and ammunition.[1]

We skirted the walls without entering the town, going through two suburbs outside the gates.

Yangi Shahr is connected with Kashgar by a fine wide shaded road, full of traffic, carts of all kinds and people riding or on foot. The British and Russian consuls had been kind enough to send couriers who guided us through a suburb to the house of the absent Russian doctor, which had been placed at our disposal. It was north-west of the town, outside the walls, near the European quarter of Consulates, offices, post-office, Swedish Mission, shops and Russian commercial agents.

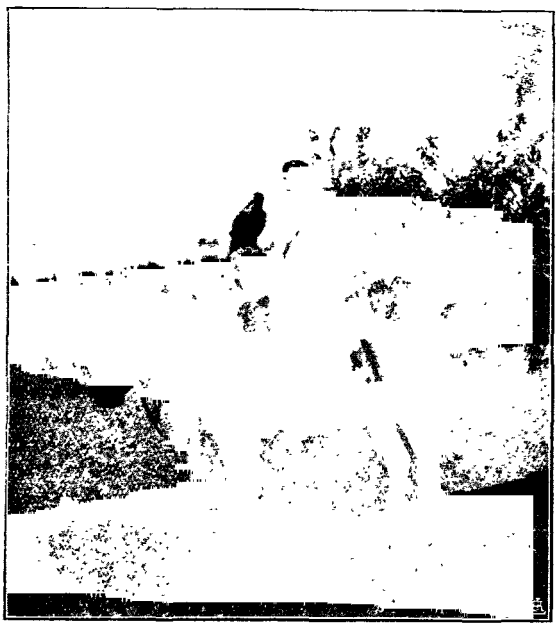
[1] See Lansdell, Vol. I, p. 431.



CHAPTER XVII

CHINESE AND RUSSIAN TURKESTAN

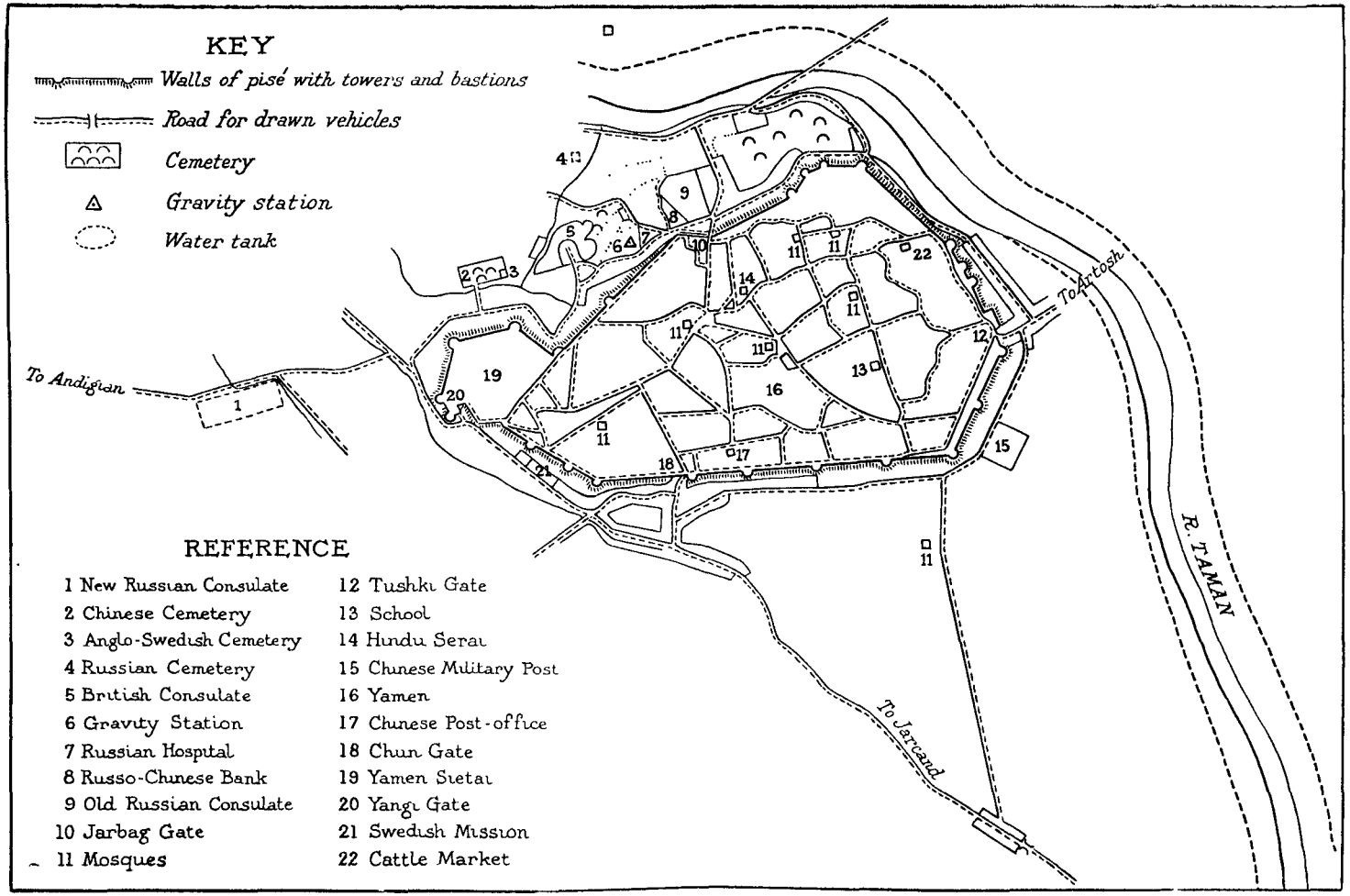
The city of Kashgar—Historical vicissitudes of Turkestan—Invasions : conflicts of races and religions, wars and conquests—Breaking up the caravan—Departure from Kashgar—Irkistan—Arrival in Russian Turkestan—Conclusion of the geophysical work at Tashkent—The Return to Italy.



THE city of Kashgar, like Yarkand, is surrounded by walls, but is somewhat smaller in circumference. It is not the " Cascar " or " Casigar " [1] of Marco Polo ; that was destroyed at the beginning of the sixteenth century by Mirza Aba Bakr, and its ruins, called Eski Shahr, are 14 or 15 miles east of the present city. An examination of the topographical plans will facilitate a comparison between the cities of Kashgar and Yarkand.[2] Kashgar is a large congeries of one-storied mud-brick houses, huddled together with scarcely space for alleys and streets. Flat-terraced roofs alternate with the quadrangular openings formed by the courtyards ; or with tumble-down walls above which rises the façade of a mosque or *medresse*, with turreted corners and

[1] According to Bellew (*Kashmir and Kashgar*, p. 308), the name comes from the Sanscrit Kasigarh, or " Fort of Kasi." He gives a description and history of Eski Shar (Ancient City ; Kuhna Shar= Old City) and of the modern Kashgar, which, according to Lansdell (*op. cit.*, Vol. I, p. 435) has 40,000 inhabitants.

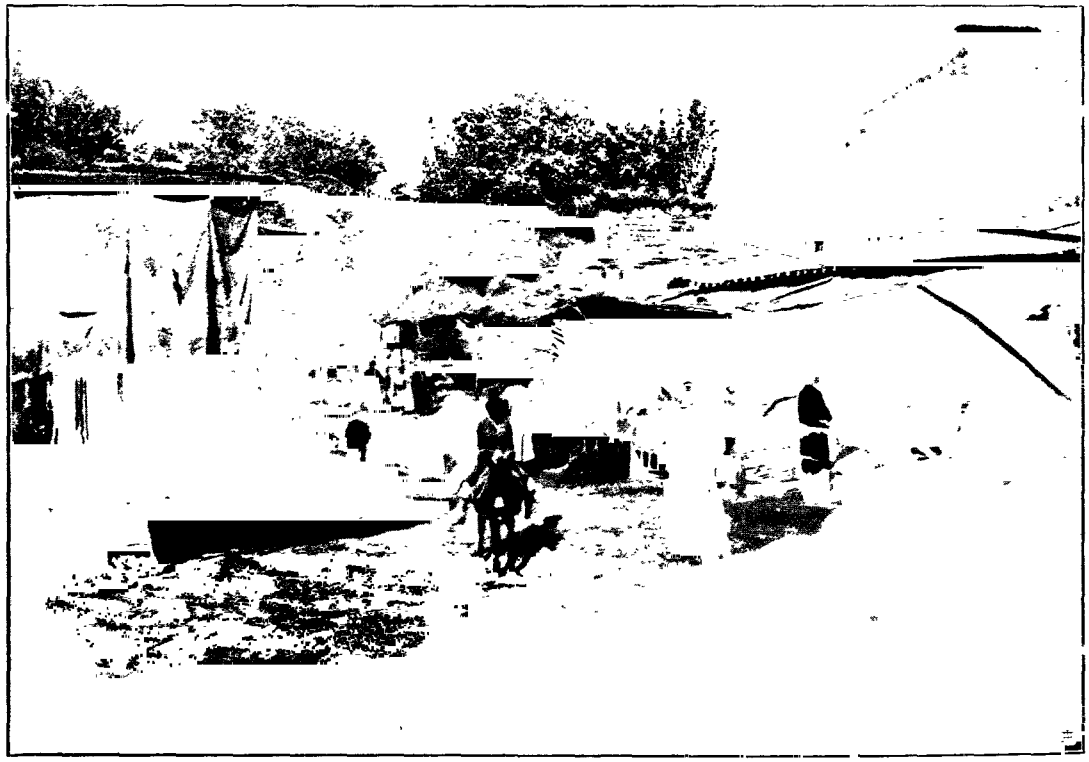
[2] Forsyth's *Report* has a plan of Yarkand and one of Kashgar (pp. 241 and 247). The first does not differ in essentials from ours ; in the plan of Kashgar the Yamen is not shown—the seat of the Chinese government, situated in an extension of the city wall at the south-west corner of the city.



Plan of the city of Kashgar.

a large pointed arch in the centre above the door. In the bazaar, however, the streets are fairly wide. It is a simple village market as at Yarkand; a few Russian and English goods are to be had, but they are of no great value. The people of Kashgar, however, made a better showing than those we had hitherto seen, and seemed both healthier and more prosperous.

Certainly one suffers a great disillusionment on visiting the large cities of Eastern



Bazaar street, Kashgar.

Turkestan. It does not seem possible that these aggregations of mud houses, these commonplace people without culture, art, or any refinement, these peasant markets, should be all that remains of a legendary region, once the renowned centre of the great Euro-Asiatic continent, the scene of century-long struggles between different races, of the migrations of whole peoples and of the most diverse cultures, Buddhist, Christian and Mohammedan. Was there a change in the climate, an ever-increasing dryness that turned this vast region into a desert and buried its cities and villages in the sand?[1] Or

[1] It is asserted by E. Delmar Morgan (in the Introduction to "Journey of Carey, etc.," *Roy. Geog. Soc. Suppl. Papers*, Vol. III, 1893, p. 13) that in the space comprised between Khotan, the Ak-Su and

did the fierce struggles between Iranians and Turanians cause the work of irrigation to be abandoned, the canals and ditches to be choked with sand and the precious water dispersed over the plain? For years geologists and archæologists have disputed and compared notes without coming to an agreement.[1] Certain it is that every vestige of the history of the land is wiped out. It is easier, sitting at home and reading, to conjure up a picture of the hosts that clashed on that vast battle-ground, than it is to realize it with the great desert of Central Asia before one's eyes.[2]

Lob Nor—that is in the area of the Tarim desert—there were once 23 cities and 360 villages. The first person to have visited one of these buried cities in the Khotan region seems to have been Johnson, in 1865. Forsyth and the members of his second Mission (1873) collected information and legends of the buried cities, also Greek, Byzantine and Bactrian coins, jewels and statuettes of gods, found in the ruins. Forsyth tells (" On the Buried Cities in the Shifting Sands of the Great Desert of Gobi," in *Proc. Roy. Geog. Soc.* Vol. XXI, 1876, p. 33) that in the bazaar at Yarkand cubes of compressed tea (brick-tea) were sold, which came from the excavations and the plundering of the ruins near Khotan. The accounts in the Turkish and Chinese chronicles, as well as the finding of skeletons and mummified bodies in the houses, seem to prove that the disaster was sometimes unexpected and sudden, a cataclysm, such as a tempest of wind and sand, so violent that no time was left for flight. After Forsyth's visit, archæological expeditions were organized, which revealed the great extent of the ruins and brought to light statues, frescoes and whole libraries, with manuscripts and inscriptions in many languages, some of them entirely unknown. Among the most important and productive campaigns of exploration were the three conducted by Sir Aurel Stein between 1900 and 1915. The very important scientific and historical results are embodied in his three books: *Ancient Khotan*, 2 vols., Oxford, 1907; *Serindia*, 4 vols. and atlas, Oxford, 1921; and *Innermost Asia*, 3 vols. and atlas, Oxford, 1928. Another memorable archæological expedition is the French one of 1906, under the leadership of Paul Pelliot. Its results are embodied in twelve 4to volumes published between 1920 and 1930. Dr. A. von Le Coq, a German archæologist, led three expeditions in Central Asia between 1903 and 1913–14 (see *Auf Hellas Spuren in Ost-Turkistan*, Leipsic, 1926, and *Von Land und Leuten in Ost-Turkistan*, Leipsic, 1928).

[1] On the vexed question of the drying-up of the Euro-Asiatic continent, see Ellsworth Huntington, *The Pulse of Asia*, London, 1907, and his communications in the *Geog. Jour.*, Vol. XXVIII, 1906, p. 352, and Vol. XLIV, 1914, p. 203, and the article by J. W. Gregory in *Geog. Jour.*, Vol. XLIII, 1914, pp. 148 and 293, with the correspondence following, pp. 451 and 705. The most recent contributions to the question are from Sir A. Stein, *Innermost Asia*, Vol. I, p. 80, and *Geog. Jour.*, Vol. LXV, 1925, p. 487; W. Rickmer-Rickmers, " The Alai Pamirs in 1913 and 1928," *Geog. Jour.*, 1929, Vol. LXXIV, p. 209; R. F. C. Schomberg, " The Climatic Conditions in the Tarim Basin," *Geog. Jour.*, Vol. LXXV, 1930, p. 313; Helmut de Terra, "Zum Problem der Austrocknung des Innerasiens," *Zeitschr. der Gesch. f. Erdkunde*, 1930, p. 161; E. Trinkler, "Die Lobwüste und das Lobnor Problem auf Grund der neuesten Forschungen," *Zeitschr. der Gesch. fur Erdkunde*, 1929, p. 353; " Tarimbecken und Takla-makan-Wüste," *Zeitschr. d. Gesch. f. Erdkunde*, 1930, p. 350. Trinkler agrees with the view of Rickmers, Burrard and Stein on the continued regression of the glaciers, relics of the last glacial period. But Professor A. Penck is of a different opinion (see his " Central Asien," in *Zeitsch. d. Gesch. f. Erdkunde*, 1931, p. 1).

[2] Bellew in *Kashmir and Kashgar*, pp. 15 *sqq.*, and in his chapter in Sir T. D. Forsyth's *Report*, has given a brief account of the complicated history of Oriental Turkestan, making use largely of original Persian and Turkish sources. See also the excellent annotated edition of the Tarikh-i-Rashidi of Mirza Muhammad Haidar by N. Elias; and E. Denison Ross, *A History of the Moghuls in Central Asia*; London, 1898. Other important historical sources are the *Chinese Annals* (Mélanges asiatiques

From prehistoric to medieval times, there was a constant passing of nomad warriors, Iranians, Turks and Mongols. The first inhabitants, Sacae or Scythae, spread westward beyond the barrier of the Tien Shan and Alai mountains as far as the Oxus (the modern Amu Daria), until the Macedonian conquest (327–5 B.C.) halved their empire, and confined them to the basin of Eastern Turkestan. A century later began the invasions of the Mongol Tartars, migrants from their territories to the north of the Great Wall of China. First came a tribe or clan called the Yuechi or Kushans, under pressure from another people, the Uighurs or Huns, which did not relax until the Kushans had passed beyond the basin of the Tarim (about 126 B.C.) and were dispersed partly in Tibet, partly in the Græco-Bactrian kingdom (under Mithridates). The Yuechi ended by conquering the country and substituting their own commonwealth, which was called Tokharistan. Meanwhile the Uighurs continued their march westward, pushing their conquests as far as the Volga.

But China could not tolerate the consolidation of so vast an empire across the route of her flourishing trade with the West; and a series of wars began which lasted a century and a half, until in A.D. 94, under the Emperor Ming-ti, General Pan Ch'ao conquered Kashgar; nor did he stop there, but continued his victorious march as far as the Caspian Sea (A.D. 102). He was so drunk with success that he conceived the plan of conquering the Roman Empire!

The subjection of Eastern Turkestan to China lasted six centuries, and we have information upon this period in the diaries of Buddhist pilgrims moving from China to India to visit the sacred places and to obtain canonical and doctrinal instruction: Fa Hian in the fifth century, Sung Yun in the sixth, and Hiuen Tsiang in the seventh.[1] At that time the greatest monasteries, the richest temples, the most solemn and splendid ceremonial were, it seems, to be found in the district of Khotan. None of these pilgrims make any reference to contact with Christians, but there was a bishop at Samarkand a century before Hiuen Tsiang; and while Hiuen was in India, the Nestorian missionary Olopan came from Syria to China to found the Christian Church there, in the year 635.[2]

et Nouveaux Mélanges, Paris, 1825 and 1829) and Abel Rémusat, *Histoire de la Ville de Khotan, tirée des Annales de la Chine*, Paris, 1820. A sketch of the history of Turkestan is also given by Yule (*Cathay*, Vol. IV, p. 187), also by Lansdell (*op. cit.*, Vol. II, pp. 48 *sqq.*, pp. 207 *sqq.*). The historical information in the text has been drawn from these and other authors to be cited as they occur.

[1] See S. Beal, *Travels of Fah Hian and Sung Yun*, etc., London, 1869, and *Si-yu-ki, Buddhist Records of the Western World*, London, 1906, 2 vols; also S. Julien, *Historie de la vie de Hiouen Tsiang*, etc., Paris, 1853.

[2] About two centuries before, in 431, Nestorius had been condemned as a heretic by the Council of Ephesus; but his followers dispersed themselves throughout Persia, and thence into the two Turkestans and China; they founded bishoprics in all the important centres and endured, with surprising vitality, up to the thirteenth or fourteenth century, holding their own against Buddhism and Islam. They gave the Syrian alphabet to the Uighurs, and it was adopted from them by the

At the beginning of the eighth century, Tarim succeeded in freeing itself from the Chinese yoke; but was split up into several small states among which Khotan generally predominated. Under these conditions, it was easily invaded in 713 by the Arabs, who, having finally succeeded, after repeated campaigns, in settling themselves in Western Turkestan, crossed the mountains, descended on Kashgar, and pushed on to Turfan, on the borders of China proper. But this was no more than a raid; the Islamic conquest was again undertaken, two centuries later (in the interval, for nearly a hundred years, Turkestan was under the rule of Tibet). The descendants of a dynasty founded by Saman, who came originally from Balkh, a little state south of Bokhara, founded an empire extending from Ispahan to Gobi. However, the conversion or moslemizing of the Tarim only began in the eleventh century, when Bughra Khan, an Uighur chief, rose to power and leadership. The story of his conversion, his miracles, his conquests and bloody struggles against the Buddhists of Khotan led by his son Hassan and afterwards by his widow Bibi Miriam (Queen Mary) and other warriors and martyrs for the faith, whose tombs are scattered throughout Turkestan, is a saga in which legend and history are interwoven.[1]

The country seemed at last to be united under a dynasty that might be called national, but this, too, proved to be only an episode in its long and bloody history. After the decline of the Chinese lordship, for nearly 400 years the invaders of Turkestan had come from the west. In the thirteenth century there began again the invasions of the Mongol hordes, irresistible hosts migrating from the north and east. First to come were the Karakitai from the north; they held the country for a hundred years. Then after a final Buddhist upheaval, in which the Kirghiz Koshluk, whose wife was a Nestorian Christian, succeeded in making himself master for a few years, there came upon the scene (towards 1220) the great conqueror Jenghiz Khan, the founder of the Moghul Empire; and Tarim took the name of Moghulistan. Jenghiz and his son Jagatai carried the frontiers of the Empire from the Pacific almost to the Baltic, laying waste half Asia and a good part of Europe, and rousing unspeakable terror in the whole western world. The report of the tolerance or religious indifference of the Mongol Khans, and the friendly welcome given to Buddhists, Mohammedans and Nestorians at their court, induced the Church to try to gain influence there by sending out missionaries. Such was the origin of the travels of Giovanni da Pian del Carpine (1245), Rubruquis (1253), Odorico da Pordenone (1322–8) and Giovanni de Marignolli, papal legate at Pekin from 1342 to 1346. After Marignolli there is no

Mongols and the Manchus. It is a question whether the schism provoked at Ephesus, more by reason of the intrigues of rival patriarchs than because of doctrinal matters, did not lose a large part of Asia to the Catholic Church. (See on this point the clear summing up of Sir Henry Yule, in the chapter called "Nestorian Christianity in China," in *Cathay and the Way Thither*, Vol. I, pp. 101–23.)

[1] Bellew has drawn this material from a collection of lives of Mohammedan saints, called *Taẓkira Bughra Khan* (see his chapter in the Forsyth *Report*, pp. 121 *sqq.*).

further mention of Christianity in Central Asia. Besides these must be mentioned Haython I, King of Little Armenia, who went to the court of the Mongol Khan in 1254 on a political mission, and Marco Polo, in 1271, urged thither more by a craving for travel and adventure than by commercial greed.

At the time of Marco Polo, the empire of Jenghiz Khan was already parcelled out among his successors. They quarrelled over Kashgar and in the end it became an independent kingdom under Tugluk Timur, a descendant of Jagatai (middle of the fourteenth century). This Tugluk was the founder of the dynasty of the Jagatai Khans, which lasted from 1360 to 1572.[1] But it must not be imagined that this was a period of peaceful successions to the throne or of a tranquil and orderly existence for Turkestan. It was full of strife and conquest, of thrones usurped by murder, and unrest of all kinds. On the death of Tugluk, Kamaruddin Dughlat, Governor of Kashgar, made himself master of the city, killing all his predecessor's sons, except the youngest, Khizr Khoja.[2] He was not allowed to enjoy the fruits of his treachery in peace. During his government and that of his successor Khizr Khoja (1383) Turkestan, or Moghulistan, as it was then called, was invaded five times by the armies of Timur i Leng, Timur the Lame (the famous Tamerlane), lord of Samarkand. After the last campaign, the country, which was completely devastated, remained in subjection to the Mongol Khans of Samarkand for more than a century and a half; all this time divisions and sanguinary struggles continued and brief separate kingdoms were made and unmade.

At the beginning of the sixteenth century a nephew of Tamerlane, Aba Bakr Mirza,[3] who was a cruel and despotic ruler, found new sources of wealth in despoiling the cities and tombs buried in the desert. For this he employed criminals condemned to forced labour. He made Yarkand the capital of the kingdom. He had to contend with Babur (or Baber, the founder of the Moghul dynasty in India), who sent his ally, Sultan Said, against him. It was during this war, in 1513, that Aba Bakr destroyed Eski Shahr, the ancient Kashgar, turning the River Kisil Su from its course, it is said, so that it might undermine the fortifications (built of dried mud-bricks, as usual in Turkestan). Then, in seven days, by the labours of 10,000 men, he built the present Kashgar, a little distance above the ancient one.

Sultan Said, who succeeded him, is the same who invaded Baltistan and Ladak with 5,000 men and died on his homeward way at Daulat Beg-uldi at the foot of the Karakoram pass.[4] He was succeeded by his son Rashid, brother of Mirza Haidar, the author of the Tarik-i-Rashidi chronicle, which relates the deeds and adventures of Sultan Said. Rashid died in 1572, the last of the Jagatai dynasty, which had existed

[1] See Yule (*Cathay*, etc., Vol. IV, p. 160), for the dates and dynasties of the Moghul rulers in Turkestan.

[2] So Lansdell; Bellew calls him Ilyas.

[3] Called Iskandar Mirza by Forsyth (*Autobiography*, p. 168).

[4] See pp. 44 and 413.

212 years. During this period Mohammedanism had won over the whole country, wiping out every trace of other religions. The *mullahs*, who were most influential, had been granted privileges, lands, and lordship by the Khans. One of these ecclesiastics, Makdum Azam (the Great Master), an important priest of Samarkand who boasted descent from the prophet, had settled in Kashgar with his children during the reign of Rashid. They became sufficiently powerful to contest the lordship of the country, relying on the support of rival tribes of Kirghiz. The followers of the eldest son, Khoja Muhammed Amin, were called Aktaglik, or "White Mountaineers," by their supporters the Kirghiz of Ak-Tag (mountains to the north of Kashgar); those of the youngest son Khoja Ishak, favoured by the Kirghiz coming from the mountains to the south-west, took the name Karataglik or "Black Mountaineers." Such was the origin of a faction known as the Khoja, or Lords; the country, a prey to disputes between them, the Kirghiz and the Khans who were Rashid's successors, fell into indescribable confusion. The Portuguese Father Bento de Goës came to Yarkand —which was still the capital—during this period (in 1603), in the course of his intrepid journey from Agra to China, and remained there a year.[1]

After various vicissitudes Hidayatulla, a Khoja head of the "Whites," driven from Kashgar by the "Blacks," went to Kashmir and Lhasa to beg the help of the Dalai Lama. The Lama sent him with a recommendation to the head of the Dzungari or Kalmucks, with the result that a fresh invasion took place, which made Yarkand a dependency of Dzungaria for seventy-eight years.

And now, after an interval of more than ten centuries, during which there had been a succession of Arabs, Uighurs, the hordes of Karakitai and of Jenghiz Khan, the Moghuls of Samarkand, the Khoja priests, the Kirghiz and the Kalmucks, China appeared once more upon the scene. In the reign of the Manchu emperor Kien Lung, in the two years following the conquest of Dzungaria in 1757, she took possession of Kashgar and of Yarkand (not of Khotan). The Khoja crossed the mountains and sought refuge in Ferghana and Tashkent, where they hastened to recruit and organize for the counter-attack. In the first half of the nineteenth century they invaded Kashgar four times as well as inciting rebellions inside the country. The last of these incursions, in 1857, was led by Wali Khan, a cruel and vicious tyrant—he it was who caused Adolf Schlagintweit, at the age of 28, to be murdered under the walls of Kashgar.[2]

The Chinese had easily defeated these attempts; but a few years later a more serious revolt broke out, that of the Tungans or Chinese Mohammedans of the Kansu and Shensi provinces, which spread rapidly to Dzungaria and Turkestan (1863). Kök

[1] See the account of de Goës' journey in Yule's *Cathay*, etc., Vol. IV, pp. 169 *sqq.* The description of Yarkand is on pp. 218–27.

[2] See the particulars of Adolf von Schlagintweit's last journey, and of his tragic death, as reconstructed from various sources, in Hermann von Schlagintweit, *op. cit.*, Vol. IV, pp. 267 *sqq.*

Yar fell first, then Yarkand, where 7,000 Chinese were put to death. Then followed the massacres of Khotan, Yangi Hissar, Kashgar and Ak-Su. The *amban* of Yarkand, besieged in the Yangi Shahr, set fire to the magazine and perished in the explosion with his family and officers. But the conquerors soon began to fall out among themselves, to the profit of Khoja Buzurg Khan, who sallied forth from Tashkent upon Kashgar with a small armed following commanded by a soldier of fortune, Yakub Beg. He was well received by the people of Kashgar, and began a siege of the Yangi Shahr, until the *amban*, with his family and followers, sacrificed himself like the *amban* of Yarkand in the flames he himself had kindled. Yakub Beg lost no time in ridding himself of the local Khoja, partly by arms but more by treachery. He seized the government of Yarkand and Khotan, sent his chief Buzurg on a pilgrimage to Mecca and had himself proclaimed Khan of all Turkestan with the title of Atalik Ghazi (Champion of the Faith). Afterwards he subjugated the Tungans and Dzungari Kalmuks, and established himself at Ak-Su, reigning unmolested until 1876. Gifted with a political mind, Atalik at once conceived the idea of establishing friendly relations with Russia, at that time engaged in the conquest of Western Turkestan, and with England. At his invitation, two Russian missions went to Turkestan (1868 and 1870) commanded by Captain Reinthal [1]; also the two English missions of Sir D. Forsyth (in 1870 and 1873). The travels of Johnson, Shaw and Hayward belong to this period and the two first expeditions of General Prejevalsky. In fact, had it not been for these contacts with the Western world, which had never before been in such close touch with Turkestan, the interruption in Chinese rule due to the conquest of Yakub Beg would probably have had no greater importance in the history of Turkestan than any ordinary *coup de main*, like so many others before it.

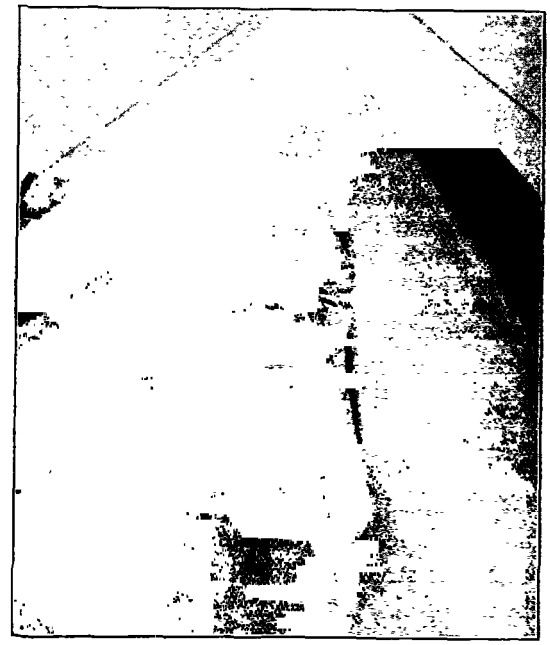
The break lasted little more than ten years. During 1877 and 1878, Chinese domination was re-established all over Tarim, which in the following years was gradually reorganized as a Chinese province, ruled by a governor living at Urumchi, with an armed force of 8,000 men at his disposal. Since then, during the last forty years, there has been increasing exploration and travel, by Russians, English, French, German, Swedes (Sven Hedin), and even Japanese.[2]

We remained at Kashgar for eleven days, the time necessary for the work of the geophysical station. We exchanged formal visits with the *taotai*, who lived in a *yamen*

[1] Reinthal wrote no geographical account of his travels. Twenty years before his time the Russian Captain Valikhanoff had already reached Kashgar. See the list of travellers and official Russian missions, with bibliography, in H. von Schlagintweit, *op. cit.*, Vol. IV, pp. 358 *sqq.*, also in Lansdell, *op. cit.*, Vol. I, pp. 368 *sqq.*, and Vol. II, p. 60, where there is an account of the cartography of Turkestan.

[2] I need not give a list of them here. See preceding note and for the discoveries of Prejevalsky, E. Delmar Morgan, *Proc. Roy. Geog. Soc.*, N.S., Vol. IX, 1887, p. 213, and the *Supplementary Papers* of the *Roy. Geog. Soc.*, Vol. III, 1893, p. 58.

the size of a government office together with the *tung-shan*, in charge of foreign affairs, the *hsien hwan*, prefect or head of the district, and others. This last personage wore an overcoat of dark cloth with a double row of white metal buttons, which looked like a livery. The Chinese republic was still such a new thing that the officials in this far-away province were quite disconcerted by the shattering of so many venerated traditions and customs. The pigtail was abolished, but no new fashion of hair-dressing had become general. Some people had long hair, cut round on the shoulders, others wore only a fringe on the forehead, or had continued shaving the head round a little central patch of short hair, which used to be the starting-point of the pigtail. They had generally adopted the soft hat, horribly out of keeping with the long black or blue Chinese coat, but they did not know whether or not to uncover the head in greeting. As it was not possible for us to give up a whole afternoon to the usual ceremonial dinner with the *taotai*, he sent us a large hamper containing a meal of ten courses.



Ghulam Rasul Galwan, *aksakal* of Leh.

Wood, Spranger and Petigax arrived at Kashgar four days after us, in time to share the hospitable welcome given us by the British Consul-General, Sir George Macartney, who had been in Kashgar for twenty-seven years, and was deeply versed in Chinese things, and by the Russian Consul, Prince Mestchersky. Various notabilities and merchants, mostly Russian subjects, invited us to receptions in their houses and gardens.

The Russian Consul had at his disposal a guard of 70 Cossacks, commanded by an officer. The telegraph was Chinese, but there was a Russian post-office and a mail for India every ten days by way of Gilgit.

When the observations were completed, we sold everything that we no longer needed, the few remaining stores, and all the tents. The day of farewell came. Jamna Prasad and Shib Lal were obliged to winter at Kashgar because the season was already too far advanced for them to cross the passes of the Hindu Kush and the Himalayas and go down into Kashmir.[1] On the other hand Rasul Galwan, with the four Ladakis

[1] They left Kashgar on April 5th, 1915, and returned to Dehra Dun, in time to be sent to the theatre of war, in Egypt and Macedonia.

who for seven months had been entrusted with the transport of the most delicate instruments, gravimetrical pendulums, chronometers and mercurial barometers, prepared to return to Leh without delay by way of the Karakoram and the Depsang.[1] For the remainder of our journey to Russian Turkestan we only engaged a cook, a native of Ladak, who had accompanied the Prince d'Orleans on his journey of exploration in Tibet in 1890.

On October 27th we again took the road for the last stage of our journey by caravan. We had to cross the mountains which enclose the basin of the Tarim on the west dividing it from the basin of the Sir Daria in Ferghana (Russian Turkestan) at the point where the Tien Shan range meets the Alai. Here there is a depression, the Terek Dawan, about 13,000 feet high, where one crosses the range. This route has been traversed by countless hosts of armed men and refugees during the centuries of struggle for the lordship of Turkestan, but by few European travellers. General Kuropatkin in 1876, Dutreuil de Rhins with F. Grenard in 1891,[2] Littledale and his wife in 1893,[3] and Sven Hedin on his fourth expedition to Central Asia (1899–1902).[4]

From Kashgar to Osh, the first town of Ferghana, is about 250 miles, which we covered in nine days by forced marches, in spite of the advanced season and the burden of the heavy baggage.[5] We were now consumed by a feverish impatience to get back, and every delay seemed intolerable. Fortunately we were attended by Kirghiz, who are unsurpassed as caravan-men.

The road ascends the course of the Kisil Su (Red River) which down in the plain is called the Kashgar River. In the upper part of the valley, 134 miles from Kashgar and 4,260 feet higher up, is the small Russian frontier station of Irkistan. We traversed this first stretch in five stages. The road runs on the left side of the valley, on high banks of clay; at short intervals one passes by settlements of Kirghiz, groups of tents interspersed with small new houses enclosed in high square walls, round which herds of camels, oxen, sheep and goats were pastured. There was a large cemetery, that seemed to be used by the whole valley, with many monumental tombs surmounted by round or conical cupolas. And every 20 to 25 miles there is a fort, sometimes merely a look-out, sometimes a real keep with battlemented walls, most of them deserted and falling in ruins.

The third and fourth stages were the most picturesque. The path climbs a series of spurs on the left side of the valley where the compact sandstone and the clays,

[1] Rasul Galwan fell ill at Yarkand and was not able to leave before November 26th. But he successfully surmounted all the dangers of the winter journey and reached Leh safe and sound.

[2] F. Grenard, *Mission Scientifique dans la haute Asie*, Paris, 1897–8.

[3] St. George R. Littledale, "A Journey across Central Asia," *Geog. Jour.*, Vol. III, 1894, p. 446.

[4] Sven Hedin did not cross the Terek Dawan, but a pass of the Alai range, a longer and easier route which is usually preferred by the Russians. See his *Central Asia and Tibet*; London, 1893, Vol. I, pp. 16 *sqq.*

[5] Dainelli and Marinelli took the same time for the journey, six weeks earlier.

irregularly hollowed out by weather and waters, give the landscape an appearance of a sea in a tempest. The layers of harder rock project from the sides and crests like roofs or isolated tables. In many places a thin limestone crust covers the ground, running off in stalactites and fringes from the projecting layers, and here and there forming pierced curtains before the holes and caves hollowed out in the clay. There are frequent springs of sulphur-water, surrounded by efflorescences and deposits of sulphur. Everything is extraordinarily enhanced by the varied colour of the rocks. There are greenish hills, yellow, brown, red, violet and black, and sections crossed with great red-purple stripes, cut across by greenish bands in the middle; the folding of the strata causes undulating or zigzag lines, sometimes of colours melting into each other, like certain embroideries. We also went through a zone of marbles. The snow and the distant glacier-covered mountains formed the background. In a little valley we found a copper-mine in full swing, with miners coming and going, and lines of camels bringing coal from a mine near by in order to smelt the mineral on the spot.[1]

We had done with encampments; we lodged each night in primitive *serai*, in small windowless rooms, with a square hole in the roof for air and light. But there was generally an open chimney where a good fire could be lit. Food was scarce, and the Kirghiz sold it unwillingly. In the midst of a pastoral people, we could not get hold of milk or eggs, rarely of fowls. Fuel was scarce and very dear. One might buy a fowl for a few kopeks, but the wood to cook it would cost a rouble.

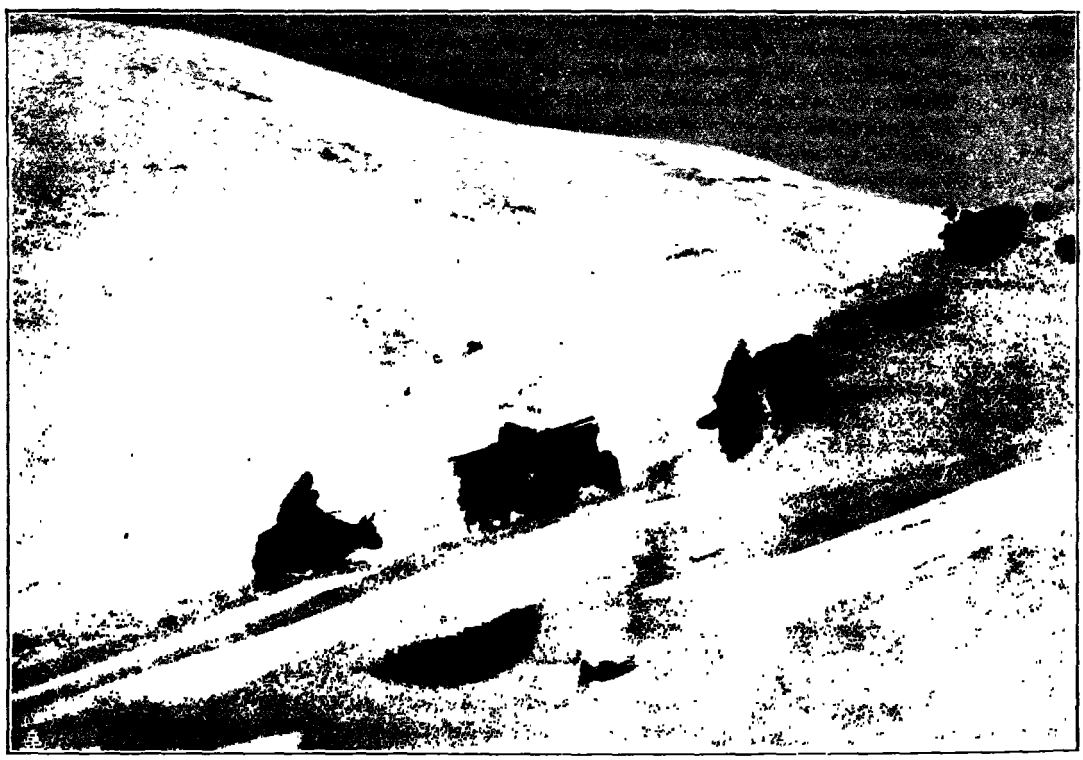
On October 31st we reached Irkistan (8,530 feet above sea-level), where there was a Russian barracks, a customs office and a few poor cottages. The Russian telegraph line has its terminus here, and in the evening, as we were gathered round the hospitable board of Mr. Dzampayeff, the customs officer, an operator brought us the news, which had just come, of Turkey's entrance into the War, with the bombardment of Odessa and Theodosia, three days before. This meant that our most direct and convenient route home, by way of the Black Sea, was closed to us.

We went up from Irkistan to Terek Dawan in two stages. At this time of year the snow was very deep. On the way we passed parties of Kirghiz, men, women and children, who were coming down from the high *aghil* with all their possessions on yaks, camels, horses or donkeys, followed by the last flocks of sheep and goats. They came out of the side valleys where they had ploughed up the snow in deep furrows. We crossed two spurs, 1,300 feet above the valley, from which we obtained magnificent views of the Trans-Alai chain, laden with snow from head to foot, and descended again on the banks of the Kisil Su. After crossing the valley, we went up a tributary on the right which led to the pass, as far as a small house, 12,220 feet above sea-level, where we arrived after nightfall. The little hospice, surrounded by snowy slopes all suffused

[1] There are considerable coal strata in Turkestan, besides various kinds of minerals, chiefly iron and copper, also jade.

with the light of the full moon, reminded us of our mountain huts. It had only one small room where we managed with difficulty to lay out our six sleeping-bags.

The next day we attacked the last climb of our campaign. We left the hut at eight o'clock, with a temperature of 8° F. The snow was very deep; we overtook a native transport caravan and passed it by a great effort, turning out of the beaten track into the soft snow. But the track itself disappeared in the last stretch, lost in drifts;



Kirghiz on the march, above Irkistan.

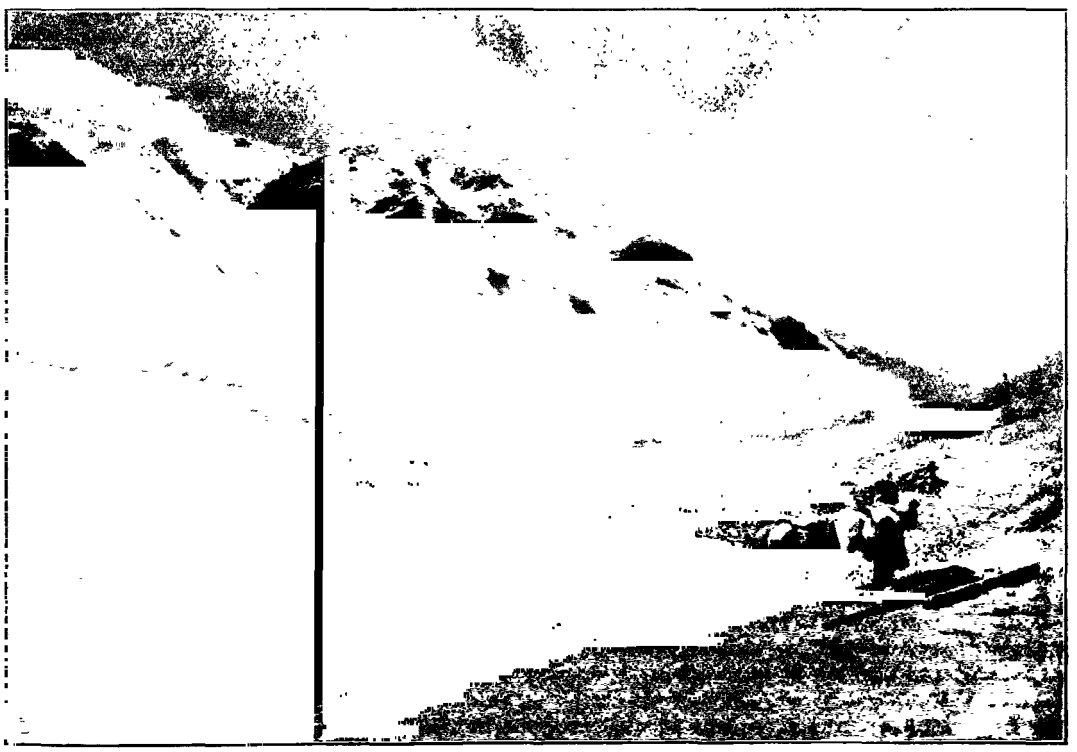
at times we thought we could not go on. However, in less than two hours we reached the top of the pass, 13,520 feet above sea-level.[1] The diffused light of the covered sky and the uniform whiteness of the snow deprived the landscape of every salient feature.

We immediately began the descent, followed by a strong wind blowing from the pass, driving clouds of powdery snow. There was not the faintest sign of a track, and we went down on foot, dragging the horses behind us. Sometimes they were

[1] The altitude given on the French map Asie 1.000.000e, sheet 40 N. 72 E. (4120 m.). The map of the Indian Trigonometrical Survey (sheet 37, 1919) gives the Terek Dawan as 12,700 feet.

up to the belly in snow, pawing about without finding a foothold. The descent was steep, the snow continued deep for more than 3,000 feet below the pass. After two-and-a-half hours we reached a group of *akoi*, buried in snow like the rounded huts of Lapps or Esquimaux; we lunched and warmed ourselves at a good fire of juniper boughs.

The valley now narrowed into wooded gorges, and we were able to ride again.



Sufi Kurgan, in the Gulcha valley.

After a good distance we came out into the broad Gulcha valley at Sufi Kurgan (6,720 feet high), where we found a *serai* with a room for Europeans, kept by a Russian woman, a grasping old harpy, who, after much difficulty and for an exorbitant price, consented to let us have the few provisions we needed for supper and some wood for cooking them. Our transport caravan, anxiously awaited, arrived late at night. There were only five guides for 26 horses, and it seemed wonderful to us that they had succeeded in crossing the mountains without losing one animal or one load, considering the difficulty we had found in leading one unloaded horse each. We made two more marches on fair routes to Gulcha and to Langar, and here we reached the carriage road

and three light carriages, in which we comfortably accomplished the last stage to Osh, across a perfect sea of mud.

We were still in the heart of Asia, yet we felt as if we had been suddenly dropped from the most remote space into the middle of the Western world. Osh, which I remembered from a visit made ten years earlier as a native village at the foot of a rocky hill surmounted by a mosque (Takt-i-Suliman), was so transformed as to be

Observatory and geodetic station, Tashkent.

unrecognizable. We found a large Russian quarter, electric light, a good inn, and, to make our first contact with Europeans quite complete, a group of Austrian officers, prisoners, who, poor things, were hoping that we could give them news of the War !

On the evening of November 6th, after having covered 31 miles by carriage, with the baggage piled on three *araba*, we reached Andijan and the railway, after thirteen months of travel by caravan routes.

Three days later we were at Tashkent, the capital of Russian Turkestan, where there is an Observatory and a Geodetic Institute. Here Abetti, assisted by Ginori, completed the geophysical work, closing the series of stations begun the previous year

at Dehra Dun. Colonel Ausan, Director of the Observatory, Colonel Zaleski, who had already made a large number of gravimetrical stations in Turkestan, and the astronomer, Bulajewski, were most helpful and eager to assist.

Meanwhile I came to an agreement with the Russian authorities about our homeward journey by the shortest way that was open to us, *via* Odessa, Roumania and Serbia. But we were obliged to give up the idea of taking all of our scientific material with us. The exigencies of war, with mobilization not yet completed in these remote provinces of the Empire, would not allow of the transport by rail of such heavy and cumbersome baggage. So it came about that after having conveyed our instruments over the Himalayas, the Tibetan plateaux, the Karakoram, the Kuen Lun, the deserts of Central Asia and the Tien Shan, by natural means of transport, men and beasts, and after succeeding with infinite care and precaution in getting them unharmed to a railway terminus, we met there an insurmountable obstacle to getting them back to Italy ! However, I got leave to take all that was necessary for the completion of our work —the full data of the observations, the maps, the photographic negatives since the Depsang plateau, and also the chronometers, photographic lenses and the Sterneck gravimetrical apparatus with its pendulums.[1] All the rest—that is, the astronomical, geodetic and magnetic instruments, the cameras and the Fortin barometers—was packed in eighteen cases, and entrusted to General Repioff, Director of the Military Topographical Institute at Tashkent, to be sent on to us at the end of the War.[2]

We left Tashkent on the evening of November 27th, for our long inactive railway journey. We arrived at Odessa in nine days, by Orenburg, Samara, and Kharkoff. A few days later we were in Roumania, and received an unforgettable welcome from the Sovereigns, the Government, and the Italian colony. Our Minister, Comm. Fasciotti, had arranged for our return through Austria, because the way through Serbia was too complicated and uncertain for the luggage we had with us.

So we had to part from our English colleagues, Wood and Spranger, who left for Salonika to embark for Brindisi. We Italians went to Budapest and on December 18th we crossed the borders of our country after more than sixteen months of absence.

[1] We had to take the gravimetric apparatus back with us, to test the pendulums ; this was done by Alessio and Abetti at the base station at Genoa soon after our return.

[2] The whole of the material left at Tashkent was returned to us in perfect condition by the Soviet Government in 1925.

CHAPTER XVIII

SYNOPSIS OF RESULTS

Gravity, magnetism, astronomical geodesy—Methods and instruments—General conclusions—Survey —Meteorology, aerology and solar radiation—Geographical excursions of Dainelli: collections of minerals, fossils, flora and fauna—Geology, glaciology, present physical features—Anthropogeography, ethnology, anthropology.

THE publication of the scientific reports of the expedition is now nearly complete, and it is possible to give a general outline of the results achieved.

To begin with geophysics: we had planned to make a chain of gravimetrical stations, connecting the network of stations made by the Survey of India in the plains at the foot of the Himalaya with those done in Ferghana and the Pamir by the Russian Military Geographical Service. This was successfully accomplished by the establishment of a series of stations stretching across the mountain ranges of Central Asia and across Eastern Turkestan, which made it possible to determine the deviation from the vertical and the anomalies of gravity in a region of exceptional interest for its altitude and for its proximity to the Tibetan plateaux, the largest uplifts of the world. The series consists of fourteen stations: Dehra Dun, Srinagar, Dras, Tolti, Wazul Hadur, Skardu, Kargil, Lamayuru, Leh, Depsang, Suget Karaul, Yarkand, Kashgar and Tashkent. The method adopted was the determination of relative gravity with Sterneck's modified apparatus. We had a series of eight pendulums: four from the Hydrographical Institute of the Royal Italian Navy at

Genoa, and four provided by the Prussian geodetic station at Potsdam; these were tested at Genoa before the departure of the expedition, and again after its return to Europe. The necessity of obtaining data of sufficient accuracy to permit a comparison between astronomical and geodetic co-ordinates, from which is deduced the deviation of the plumb-line, necessitated the use of instruments and methods of a much greater accuracy than those commonly used in ordinary survey-work; namely a zenithal telescope and a transit instrument of sufficient aperture, and the adoption of the wireless time-signals transmission for the determination of differences in longitude.

As regards the last, I may point out that we were among the first to experiment with this method in an expedition adapted to camp-life, and having to surmount exceptional difficulties of transport. The experiment was rendered particularly interesting by the special configuration of the land traversed, by the situation of the stations at the bottom of deep valleys, or on plateaux of great altitude, and by the interposition of the largest ranges in the world between the transmitting and the receiving stations. It was made possible by the interest taken in the expedition's work by Colonel Sir Sidney Burrard, at that time Surveyor-General of India, and by the good will and co-operation of Colonel Sir G. Ponsonby Lenox Conyngham, the then Superintendent of the Trigonometrical Survey. He made all the arrangements for the transmission of the time-signals from the Lahore wireless station, and for their simultaneous reception at Dehra Dun—our reference station—and at the stations of the expedition according to a prearranged plan, carefully carried out. We were able to obtain an approximation of $\pm$ 0·2″ for the latitudes, and the average errors in the computed differences in longitude were contained between $\pm$ 0·015″ and $\pm$ 0·054″.

For other accessory methods, such as the determination of astronomical longitude and of latitude by nautical instruments and methods, the checking of chronometers, their use in determining the astronomical and the geodetic longitude, etc., the comparative determination of altitude by mercurial barometers and hypsometers, I refer to the reports by Professor Abetti and Admiral Alessio in Vols. I and II of the first series of the *Relazioni Scientifiche*.

Without entering into a technical discussion of the gravity values obtained from our observations, and of their bearing upon the theory of isostasy, it is worth recording that the anomalies of gravity deduced from our determinations agree to a close approximation with those obtained in 1925 by Captains Glennie and Osmaston of the Survey of India, in those of their stations which were placed in proximity to our own, especially in regard to Srinagar and Wazul Hadur.

The results of our observations confirm the general conclusions drawn by the Survey of India from their own, taken in connection with those made by the Russian geodetic service: namely that the gravity values are generally in excess in the Himalaya and Karakoram ranges, and in defect to the south and to the north of them, point-

ing to equal conditions of compensation, or of lack of compensation, in the Indo-Gangetic plain and in the plain of Turkestan.

The biggest anomalies were observed at Wazul Hadur, Skardu and Tolti, situated between the Himalaya and the Karakoram, and at Yarkand and Kashgar, at the western end of Turkestan ; and it is interesting to compare the latter with similar large anomalies found by the Russian observers at Osh and Andijan, beyond the Alai and Trans-alai ranges. With these anomalies is also connected the exceptional deviation from the vertical observed at Skardu and Wazul Hadur, which finds confirmation in the deviation of latitude obtained by Captains Glennie and Osmaston in their Deosai station, No. III.

In addition to the measurements of gravity, a complete set of magnetic observations (declination, horizontal force, and dip, or inclination) was made at every station. The instruments had been carefully tested at Dehra Dun ; but at the close of the expedition, owing to the state of war in Europe, they had to be left behind, carefully packed, at Tashkent. They were not returned until 1925 ; but they were then in perfect condition ; and their testing at the Genoa Institute in 1926 revealed only slight differences, justifiable by the long interval of twelve years elapsed since 1914.

The secular variation, calculated by comparing our own readings with those obtained in 1909 by Showers of the Magnetic Department of the Carnegie Institute, has proved to be about $-3'$ yearly for declination in the region west of Depsang, and about $-2'$ on the Depsang and in the regions to the north-east of the plateau. The horizontal force has diminished by about $36\,\gamma$ yearly in the former region, and a little more in the latter ; while the inclination has increased about $6{\cdot}5'$ yearly.

Between the 16th and the 26th of January, 1914, hourly observations were made at Skardu of the variations of declination and horizontal force. By comparison with the same observations made at Dehra Dun it was ascertained that the variations are of the same magnitude in both places, and that those of Skardu take place with a slight retardation by local time. But the general character of the variations is the same. The secondary maximum happens between the 8th and the 12th hour ; the principal minimum between the 11th and 12th ; the afternoon maximum between 2 and 4 p.m. ; the secondary minimum between 5 and 6 p.m. There is a relative constancy in the night hours.[1]

I have given in Chapter XIV the main results and the extent of the survey work done by Comm. (now Admiral) A. Alessio, Professor G. Abetti, Major (now Lieut.-Col.) H. Wood and J. A. Spranger, with the two Indian Surveyors, Jamna Prasad and Shib Lal. We had a good instrumental equipment : chronometers, astronomical theodolites, tachymeters, invar tapes for the measurement of bases, levelling telescope, sextants, etc. In addition to the astronomical-geodetic and survey work done for the construction of the maps, detailed surveys, complemented by photogrammetrical

[1] See the Report of Professor Tenani on the magnetic observations in Vol. II, Series I, of *Relazioni Scientifiche*.

panoramas, were made of the ground surrounding each gravimetric-magnetic station. A long series of barometrical and hypsometrical observations, made simultaneously with those taken at the observatories of Srinagar, Dras, Skardu, Leh and Gilgit (thanks to the liberal arrangements made by Dr. G. C. Simpson, at that time director of the Meteorological Department of India), have resulted in a large quantity of new data to test the correspondence of the classical formula of Laplace with the actual differences in altitude. For the conclusions regarding the comparative precision of the hypsometric and of the barometric methods in this connection, I refer the reader to the report of Admiral Alessio in Vol. I, Series I, of the *Relazioni Scientifiche*.

Turning to meteorology: three sets of observations were made: at Skardu (7,330 feet), at Leh (11,545 feet), and on the Depsang plateau (17,590 feet). Besides the difference in altitude, the topographical setting of the three stations varied greatly; the first lay in the centre of a wide open basin at the meeting of two broad valleys, the second in a deep enclosed valley, the third on a flat high tableland.

The instrumental readings were made three times every day at Skardu, from November 1st, 1913, to February 14th, 1914; also during April, at Leh, whose observatory became the base or reference station for the observations collected on the Depsang. Here the readings were made four times a day, beginning on the 1st of May; after June the 2nd, every hour from 6 a.m. to 8 p.m.; and in July, every hour by day and night; while in the first half of August the readings four times a day were resumed.

To these were added observations of the clouds and of the wind by means of pilot balloons followed in their course with two theodolites, placed at the ends of bases of various lengths, up to 4 km., and also, when possible, by measurements of solar radiation (pyrheliometry). These last, contrary to all expectations, were greatly impeded by bad weather and by the almost permanently overcast skies, as I have explained in Chapter X, where I have also described the climate of the Depsang in the summer months, the periodic winds in the daytime, and the windless nights.

Corresponding with the diurnal variation of the wind in the lower strata of the air, there is a regular diurnal variation in pressure, with a distinct semi-diurnal period (two maxima and two minima in the 24 hours).

Dr. Alessandri, in his report on the meteorological and aerological data collected by him and Marchese Ginori (Vol. III, Series I, of *Relazioni Scientifiche*), has made a detailed comparison of the data obtained on the Depsang with those collected at the Observatory Regina Margherita on Monte Rosa (14,960 feet), and has added many interesting conclusions as to their bearing upon the applicability of the Laplace formula to barometric levelling and reduction to sea-level.

The curve representing the diurnal variations of pressure on the Depsang has no resemblance to that of the Monte Rosa observatory, and is more akin to the curve at the valley-observatory of Alagna (3,950 feet), in spite of the great difference in altitude and in location. Therefore, the altitude *per se* is not a factor in the variations of the

barometric curve; the phenomenon of variation in the vast high plateaux of Asia has the same characteristics as that observed in the plains at or near the level of the sea.

Dr. Alessandri has also determined the shape and the size of the trajectory of the local wind and the relation between wind-velocity and barometric pressure; and he has established that the influence of the tableland surface on the air-currents does not extend beyond 6,000–7,000 feet above it. Then follows a layer of air of about the same thickness, in which the winds, still variable, but not periodic, are influenced by the general conditions of the weather, or the daily variations of the general isobaric state. At or about 30,000 feet of altitude, and above, the direction of the wind is constant from the north-west, and referable to the general atmospheric currents of that region.

From the observations of solar radiation made on the Depsang, Professor Amerio has been able to determine its rate, and from those made on June 16th and July 16th he has deduced a probable mean value of the solar constant for those days of 1·92 gramme-calorie per square centimetre per minute.

There remains to deal with the rich harvest of studies, observations and collections in the various branches of geography and natural history reaped by Professor Dainelli, at first alone and later in the summer of 1914, with the help of Professor Marinelli.

During the autumn and winter of 1913–14, except for very brief intervals, Dainelli was nearly always absent from the base, making long excursions with small independent caravans across Baltistan and the whole territory of Ladak. He travelled in midwinter in the valleys Basha, Braldoh, Saltoro, Kondus, up to the fronts of the great Karakoram glaciers; up the Balti portion of the Shayok valley; along the stretch of the Indus valley between Tarkutta and Kalatse, hardly ever traversed before, and across some high passes in Purig. He also visited the Rupshu plateau and the basin of the Pangkong lake.

Later, in the summer of 1914, he and Marinelli made a long excursion on the high plateaux between the Rimu and the Aksai-Chin, and another to the glaciers of the upper Shayok, including the Rimu.

Very considerable collections were made; about 800 samples of minerals, and several cases of fossils, evidencing a long series of geological periods, from the Ordovician to the Eocene; whereas only two foraminifera and some generic statements had been reported before from this region. Also a collection of the fairly rich flora above 16,000 feet, containing a new genus and some new species; and of fishes of the Indus, also with new species. About 450 anthropological measurements were systematically taken, and plans of habitations and of nomadic dwellings, and notes on every subject of interest in the region and its people. Topographical sketches were made of particularly interesting localities, such as the basin of Skardu, and Tolti, as a typical example of human settlement; of moraine-systems of the glacial periods; and an itinerary in great part new was surveyed, from the Depsang to the Aksai-Chin.

Part of this material is still under study. Of the ten volumes planned for this section, six have been published, and an atlas. Among those nearing completion is the geological report, or description of the geological periods up to the Quaternary. Some old chronological attributions will be modified and several new ones established, thanks to the finding of fossils; while the co-ordination of fossils, minerals and observations has made it possible to trace, in addition to a geological sketch of the region, its geological history. A comparison with geological conditions of the whole Himalayan range and also of India will lead to conclusions of palæogeographical bearing.

One volume and an atlas contain the study of the glacial period. Contrary to the current views that this group of mountain ranges had not been subject to great glacial expansions in the Quaternary Age, Dainelli has proved the occurrence of two great expansions, and of at least four minor ones. By piecing together the abundant vestiges which he found in the whole region, he was able to draw a general picture of its varying conditions during the Quaternary, reconstructing the glaciers of the successive expansions, the limits of the snow-line, the great lakes formed by the damming of the valleys by glaciers, the zones left free from ice, etc. The pre-glacial, glacial and post-glacial morphology is also described.

Particularly interesting is the demonstration of two periods of uplifting, which took place in the Quaternary; one affecting also a great portion of the Trans-Himalayan region, the other only the outer chains of the Himalaya (Pir Panjal). This second uplift, which is the more recent, extending to historical times, Dainelli has been able to determine locally as amounting to about 8,200 feet. The ascertaining of these uplifts has a general bearing on the question of the glacial period.

There follows a volume containing a description of the present physical conditions, with special regard to the glaciers of the Karakoram. These are catalogued and examined in their general characteristics, as well as in their particular features; their feeding, melting, velocity, forms of the surface, shape of the fronts, and alternate advance and regression, with the conclusions that may be drawn from the facts observed. Particular attention has been given to the study of the limit of the snow-line in the whole system of ranges, as compared with its limits in the glacial period. This comparison shows how the differences between present and past conditions vary considerably from place to place, correspondingly with the orographical features, etc.

The fossils of the Palæozoic, Secondary and Tertiary ages are described by Professors E. Fossa Mancini, C. F. Parona, G. Stefanini and M. Gortani in two volumes, one of which is still in preparation; the sedimentary rocks, intrusive, effusive, vein-rocks, metamorphic, will be dealt with by Professor P. Aloisi in another volume.

The anthropo-geographical questions are treated by Dainelli in two further volumes. They contain a detailed description of the types of habitation, in their varieties and reciprocal influence; of the settlements, their location, shape and structure, and of the oases, and types of agriculture. Temporary settlements and pastoral noma-

dism are also considered, and means of transport and communications, including the old routes followed by the natives in the Karakoram and over its crest into Turkestan.

A second part deals with the characteristics of distribution as well as of population, including the question of density, as of houses and centres: migrations, religions, languages, social classes and professions, cultivation, varieties of economic value and altimetrical limits, raising of cattle, and trade.

With regard to anthropology, six different stocks are classified, and their culture, their distinctive features and costumes and reciprocal influences are described. Dainelli has distinguished for the first time as a separate anthropic group the Purigs, inhabitants of the district of the same name. In this section are reported the past and present distribution of religions—pre-Buddhist, Buddhist, Mussulman; art, as influenced by Indian, Tibetan and Mussulman art; castes; family and social organization, and finally the principal historical events and displacements of the populations, and the ethnical constitution of all these peoples.

There follows an analysis of the anthropological measurements (by Professor R. Biasutti), in support and confirmation of the preceding statements.

The last volume of this series contains an essay by Professor R. Pampanini on the flora of the Karakoram, based on all the former reports of it, and the description of the plants collected by the expedition. Also a description, by Professor D. Vinciguerra of the fishes collected in the Indus river.

Both series of scientific reports are amply illustrated from the photographs and panoramas taken in the course of the expedition by Colonel C. Antilli and by Dainelli, and are abundantly supplied with maps, plans and sketches.

BIBLIOGRAPHICAL INDEX OF WORKS QUOTED

ABETTI, G., ALESSIO, A. (ANTILLI, C., SPRANGER, J. A.), "Astronomia Geodetica, Geodesia e Topografia" (*Relazioni Scientifiche della Spedizione De Filippi*, Series I, vol. I, Bologna, 1925); 393, 479, 503, 505.

—— "Gravità e Magnetismo" (*id.* Series I, vol. II, 1929); 503.

ABRUZZI, H.R.H. Prince Luigi Amedeo of Savoia-Aosta, Duke of the, *Expedition to the Baltoro Glacier*, see DE FILIPPI.

ALESSANDRI, C. and VENTURI-GINORI, N., "Meteorologia, Aerologia e Pireliometria" (*Relazioni Scientifiche della Spedizione De Filippi*, Series I, vol. III, Bologna, 1931); 315, 505.

ALOISI, P., "Le Rocce" (*Risultati Scientifici della Spedizione De Filippi*, Series II, vol. VII, in preparation); 507.

ANDRADE, Antonio de (see PARRAUD et BILLICOQ, and WESSELS, C.); 135.

Annales de la Chine (in *Mélanges Asiatiques et Nouveaux Mélanges*, Paris, 1825 and 1829); 489.

AZEVEDO, Francisco de (see WESSELS, C.); 163, 223.

BACOT, T., "L'Ecriture Cursive Tibétaine" (*Jour. Asiat.*, Jan.-Feb. 1912); 133.

BARRETT, R. and Mrs. (Edited by), *Servant of Sahibs*, by Ghulam Rasul Galwan (Cambridge, 1923); 166.

BEAL, S., *Travels of Fah Hian and Sung Yun*, etc. (London, 1869); 490.

—— *Si-yu-ki, Buddhist Records of the Western World* (2 vols., London, 1906); 490.

BELIGATTI, F. Cassiano, of Macerata, ed. by A. Magnaghi (*Riv. Geog. Ital.*, vol. VIII, 1901); 189.

BELLEW, H. W., *Kashmir and Kashgar, a Narrative of the Journey of the Embassy to Kashgar in* 1873–74 (London, 1875); 21, 22, 28, 143, 178, 279, 454, 486, 489, 492.

BERNIER, Fr., *Travels in the Mogol Empire, 1656–68* (Ed. A. Constable, London, 1891); 13.

BIASUTTI, R. and DAINELLI, G., "I Tipi Umani" (*Relazioni Scientifiche della Spedizione De Filippi*, Series II, vol. IX, Bologna, 1925); 44, 190, 229, 241, 507, 508.

BIDDULPH, J., *Tribes of the Hindoo Koosh* (Calcutta, 1880); 43, 56.

BISHOP, I., "A Journey in Western Sze-Chuan" (*Geog. Jour.*, vol. X., 1897, p. 19); 470.

BOWER, Capt. H., "A Journey across Tibet" (*Geog. Jour.*, vol. I, 1893, p. 385); 279.

—— *Diary of a Journey across Tibet* (London, 1894); 310, 443.

—— "A Trip to Turkistan" (*Geog. Jour.*, vol. V, 1895, p. 240); 415.

BRUCE, C. Dalrymple, *In the Footsteps of Marco Polo* (London, 1907); 169, 279.

BURRARD, Col. Sir Sidney G., (and Hayden, H. H.) *A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet* (Calcutta, 1907–08); 275, 417.

—— "The Mountains of the Karakoram, a Defence of the existing Nomenclature" (*Geog. Jour.*, vol. LXXIV, 1929, p. 277); 417.

—— "The Himalayan Ranges and Godwin Austen's Map" (*Geog. Jour.*,, vol. LXXV, 1930, p. 35); 417.

—— "The Geographical Representation of the Mountains of Tibet" (*Proc. Roy. Soc. A.*, vol. CXXVII, 1930, p. 704); 417.

CAYLEY, Dr. (of the Second Forsyth Mission), " An article on Jade quarries in the Kara-Kash valley " (*Macmillan's Magazine*, Oct. 1871); 424.

CHURCH and PHELPS (cited by LONGSTAFF, T. G., *q.v.*); 397.

COCKERILL, Brig. Gen. G. K. (now Gen. Sir George), " Byways in Hunza and Nagar " (*Geog. Jour.*, vol. LX, 1922, p. 97); 434.

COLBORNE, Baber E., " Notes on the Route followed by Mr. Grosvenor's Mission in Western Yunnan " (*Roy. Geog. Soc. Suppl. Papers*, vol. I; 1882–5, p. 161); 470.

CONWAY, Sir Martin W., *Climbing and Exploration in the Karakoram Himalayas* (2 vols., New York, 1894—also published in London); 66, 159.

COTTON, J. J., *General Avitabile* (Calcutta, 1906; Italian Translation by G. De Giorgio, Naples 1907); 14.

About the Europeans who served under Ranjit Singh, see also C. Grey, *European Adventurers in Northern India, 1785–1849*, Ed. by H. L. O. Garrett (London, 1931), which came too late to be cited in text.

CUNNINGHAM, A., *Ladák, physical, statistical and historical* (London, 1854); 21, 22, 25, 31, 43, 45, 53, 62, 103, 105, 106, 114, 135, 136, 140, 165, 170, 176, 177, 178, 179, 190, 201, 209, 226, 275, 279, 284, 286, 288, 321.

—— *The Bhilsa Topes* (London, 1854); 114.

DA CUNHA, J. Gerson, *Memoir on the History of the Tooth Relic of Ceylon* (London, 1875); 201.

DAINELLI, G., *Paesi e Genti del Karakorum* (2 vols, Florence, 1924); 74, 507.

—— " Studî sul Glaciale " (*Relazioni Scientifiche della Spedizione De Filippi*, Series II, vol. III, with atlas, Bologna, 1922); 393, 402, 507.

—— " Le Condizioni delle Genti " (*id.* Series II, vol. VIII, 1924); 53, 190, 407.

—— " La Serie dei Terreni " (*id.* Series II, vol. II—in preparation); 507.

—— " La mia Spedizione nel Tibet Occidentale " (*Boll. della R. Soc. Geog. Ital.*, vol. VII, 1930, p. 865, and vol. VIII, 1931, p. 30); 3, 90, 334, 336, 341, 400.

—— " Le Condizioni fisiche attuali " (*Relazioni Scientifiche della Spedizione De Filippi*, Series II, vol. IV, 1928); 322, 393, 402, 507.

—— and O. MARINELLI, " Osservazioni sui Ghiacciai sbarranti l'alta Valle dello Shayok " (*Riv. Geog. Ital.*, vol. XXIV, 1917); 322.

DEASY, Capt. H. H., *In Tibet and Chinese Turkestan* (London, 1901); 279, 451, 466, 475.

DE FILIPPI, F., *Karakoram and Western Himalaya*; 1909 (London, 1912); 2, 43, 223, 313, 345, 425.

—— *The Ascent of Mount Saint Elias, Alaska* (London, 1900); 330.

DEL CARPINE, Giovanni di Pian, *Historia Mongalorum* (ed. by Giorgio Pullé, Florence, 1913), and in *Sinica Franciscana* (A. van den Wyngaert, O.F.M., vol. I, Florence, 1929); 428, 491.

DELLA PENNA DI BILLI, F. Orazio, " Breve Notizia del Regno del Tibet, 1730," ed. by Klaproth (*Jour. Asiat.*, vol. XIV, 1834; also English translation in C. M. Markham, *Narratives of the Mission of George Bogle to Tibet*, etc., London, 1876, Appendix); 135, 136, 338.

DELMAR MORGAN, E., *Introd. to Journey of Carey and Dalgleish in Chinese Turkistan and Northern Tibet* (*Roy. Geog. Soc., Suppl. Papers*, vol. III, 1893, p. 3); 488.

—— " The Orography of Northern Tibet as described by Gen. Prejevalsky " (*ib.*, p. 58); 494.

—— " Prejevalsky's Journeys in Central Asia " (*Proc. Roy. Geog. Soc.*, vol. IX, 1887, p. 213); 494.

DESIDERI, Father I., S.J., *An Account of Tibet 1712–1727* (ed. by F. De Fillippi, London, 1932); also in C. Puini, " Il Tibet " (*Mem. Soc. Geog. Ital.*, vol. X, Rome, 1904), and in C. WESSELS, *q.v.*; 11, 13, 19, 21, 25, 28, 30, 105, 111, 112, 134, 135, 136, 163, 164, 189, 190, 197, 223, 225.

DREW, F., *The Jummoo and Kashmir Territories* (London, 1875); 43, 56, 104, 165, 174, 190, 278, 313, 437.

DREW, F., On the Death of Mr. Hayward (Letter in *Proc. Roy. Geog. Soc.*, vol. xv., 1871, p. 117); 396.
DUKE, J., *Kashmir and Jammu* (Calcutta, 1903); 12.
DUNCAN, Jane E., *A Summer Ride through Western Tibet* (London, 1906); 58, 60.
DUTREUIL DE RHINS (see GRENARD, F.); 496.

ELIOT, Sir Charles; *Hinduism and Buddhism*, (3 vols., London, 1921); 106, 183.
ENRIQUEZ, C. M., *The Realm of the Gods* (London, 1915); 114, 120, 411.

FEATHERSTONE, Capt. B. K. (see MEINERTZHAGEN, Col. R.); 163.
FORBES, Rosita, *Angora to Afghanistan* (London, 1931); 53.
FORSYTH, Sir T. Douglas, *Autobiography and Reminiscences* (ed. by his Daughter; London, 1887); 4, 5, 278, 396, 425, 430, 437, 460, 475, 492.
—— *Report of a Mission to Yarkund in 1873*, etc.; (Calcutta, 1875, with chapters from Bellew, Chapman, Gordon, Biddulph, Trotter, Stoliczka); 165, 278, 322, 397, 404, 424, 432, 454, 468, 470, 471, 475, 479, 482, 486, 489, 491.
—— "On the Forsyth Missions" (see Letters by various members in *Proc. Roy. Geog. Soc.*, vol. xv, 1870, p. 23, and 1871, pp. 175 and 387; *Jour. Roy. Geog. Soc.*, vol. xli, 1871, p. 378; *Proc.*, vol. xviii, 1874, pp. 111 and 444); 279–312.
—— "On the Buried Cities in the shifting Sands of the Great Desert of Gobi" (*Proc. Roy. Geog. Soc.*, vol. xxi, 1876, p. 33); 489.
FOSSA MANCINI, E., PARONA, C. F., STEFANINI, G., "Fossili del Secondario e del Terziario" (*Relazion, Scientifiche della Spedizione De Filippi*, Series ii, vol. vi; Bologna, 1928); 360, 507.
FOSTER, G., *Journey from Bengal to England*, etc. (2 vols., London, 1808); 14.
FRANCIS H. T. and THOMAS E. J., *Jātaka Tales* (Cambridge, 1916;—quoted a note by Dr. Rouse p. 153); 458.
FRANCKE, Rev. A. H., *A History of Western Tibet* (London, 1907); 25, 45, 103, 112, 117, 140, 143, 151, 156, 171, 176, 177, 178, 187, 202, 209.
—— *Antiquities of Indian Tibet* (2 vols., Calcutta, 1914); 25, 58, 138, 143, 154, 171, 178, 191, 202.
—— "Notes on a Language-Map of West Tibet" (*Jour. Asiat. Soc. Bengal*, vol. lxxiii, Part i, p. 362); 133.
—— "The Dards at Kalatse" (*Mem. Asiat. Soc. Bengal*, vol. i, 1905–7, p. 413); 143, 146.
FREYRE, E.; see DESIDERI (F. De Filippi's Ed.; Appendix); 163.

GHULAM RASUL GALWAN, *Servant of Sahibs*, see BARRETT, R.
GILMOUR, J., *More about the Mongols* (Ed. by R. Lovett, London, 1893); 120.
GIORGI, A., *Alphabetum Thibetanum* (Rome, 1762); 123, 136, 191, 328.
GLENNIE, Capt. E. A., and OSMASTON, Capt. G. H., "Gravity and Latitude" (*Survey of India, Geodetic Records*, vol. i, Dehra Dun, 1928); 503, 504.
—— Major E. A., "Gravity and Deviation of the Vertical" (*ib.*; vol. iv, 1929, and vol. v, 1930); 503, 504.
GODWIN AUSTEN, Capt. H. H., "Notes on the Pangong Lake District of Ladakh, etc., 1863" (*Jour. Roy. Geog. Soc.*, vol. xxxvii, 1867, p. 344); 277, 430.
—— "The Glaciers of the Mustagh Range" (*Proc. Roy. Geog. Soc.*, vol. viii, 1873, p. 34); 285.
GOES BENTO DE, see YULE, Sir Henry, *Cathay*, vol. iv, and WESSELS C.; 135, 493.
GORDON, T. E., *The Roof of the World* (Edinburgh, 1876); 209, 278, 322, 396, 397, 404, 454.
GORTANI, M., "Fossili del Paleozoico" (*Relazioni Scientifiche della Spedizione De Filippi*, Series ii, vol. v.; Bologna—in preparation); 360, 507.

GREGORY, J. W., " Is the Earth drying up ? " (*Geog. Jour.*, vol. XLIII, 1914, p. 148); 489.

GRENARD, F., *Mission Scientifique dans la Haute Asie; 1890–95* (3 vols. and atlas; Paris, 1897–98); 496.

GRÜNWEDEL, A., *Mythologie des Buddhismus in Tibet und der Mongolei* (Leipsig, 1900); 159, 187.

GUNN, T. P., TODD, J. P., and MASON, K., " The Shyok Flood 1929 " (*Himalayan Jour.*, vol. II, 1930, p. 34); 322.

HAYWARD, G. W., " Journey from Leh to Yarkand and Kashgar, and Exploration of the Sources of the Yarkand River, 1868–69 " (*Jour. Roy. Geog. Soc.*, vol. XL, 1870, p. 33; Extracts and Discussion in *Proc. Roy. Geog. Soc.*, vol. XIV, 1869, p. 41); 165, 278, 321, 373, 395, 396, 398, 403, 404, 421, 424, 432, 434, 437, 439, 494.

—— " Letters on his Explorations in Gilgit and Yassin " (*Jour. Roy. Geog. Soc.*, vol. XLI, 1871, p. 1); 396.

—— His death (see F. Drew's letter in *Proc. Roy. Geog. Soc.*, vol. XV, 1871, p. 117); 396.

HEBER, A. Reeve and K., *Himalayan Tibet* (London, 1926); 159, 171, 205.

HEDIN, Sven, " Travels in Central Asia " (*Geog. Jour.*, vol. V, 1895, p. 154); 443, 494.

—— " Attempts to ascend Mustagh Ata " (*Geog. Jour.*, vol. VI, p. 350); 443.

—— *Central Asia and Tibet* (2 vols., London, 103); 165, 496.

—— *Trans-Himalaya* (3 vols., London, 1909–13); 22, 28, 112, 135, 191, 197, 275, 417.

—— " The Kumdan Glaciers in 1902 " (*Geog. Jour.*, vol. XXXVI, 1910, p. 185); 395.

HELLMUT DE TERRA, " Zum Problem der Austrocknung Innerasiens " (*Zeitschr. der Gesellsch. f. Erdkunde*, 1930, p. 161); 489.

HENDERSON, G. and HUME, Allan O., *Lahore to Yarkand*, etc. (London, 1873); 278, 310, 411, 471.

HENDERSON, Dr. J. (spoken of by G. T. VIGNE, *q.v.*; vol. II, pp. 104–8); 14, 43, 164.

HERODOTUS, *History* (Transl. and Ed. by G. Rawlinson and Major.-Gen. Sir H. Rawlinson, 4 vols., London, 1880); 428.

HUC, M., *Souvenirs d'un Voyage dans la Tartarie e le Thibet; 1844–46* (Paris, 1878—also transl. by W. Hazlitt, *Travels in Tartary, Thibet and China*; London, no date); 120.

HÜGEL, C. H., *Travels in Kashmir and the Punjab*, etc. (London, 1845); 14, 53.

HUMBOLDT, A. de, *Asie Centrale* (3 vols., Paris, 1843); 43.

HUNTINGTON, Ellsworth, *The Pulse of Asia* (London, 1907); 489.

—— " The Rivers of Chinese Turkistan and the Desiccation of Asia " (*Geog. Jour.*, vol. XXVIII, 1906, p. 352); 489.

—— " Climatic Changes " (*ib.*, vol. XLIV, 1914, p. 263); 489.

IBN BATUTA, in Sir H. YULE'S *Cathay*, vol. IV, and *Travels in Asia and Africa, 1325–54* (trans. and selected by H. A. R. Gibb, London, 1929); 428.

JACQUEMONT, V., *Letters describing a Journey in India, Tibet, Lahore, and Cashmere, 1828–31* (2 vols., London, 1834); 14.

JASCHKE, Dr. H. A. (quoted by MARKHAM, C. R., *q.v.*, in Introduction); 171.

JOHNSON, W. H., " Report on a Journey to Ilchi " (*Jour. Roy. Geog. Soc.*, vol. XXXVII, 1867, p. 1, and *Synopsis of Results, Trigon. Survey of India, North-West Himalaya Series*, vol. VII, Dehra Dun, 1879, pp. xxxviii–ix); 4, 165, 277, 278, 321, 394, 395, 396, 397, 398, 424, 432, 489, 494.

—— A Note about his claim to have ascended E61 (*Geog. Jour.*, vol. LIX, 1922, p. 310 see also MASON, K.); 394.

JULIEN, S., *Histoire de la Vie de Hiouen Tsiang*, etc. (Paris, 1853); 490.

KAWAGUCHI EKAI, *Three Years in Tibet* (Madras, 1909); 133, 136, 187.
KNIGHT, E. F., *Where Three Empires meet* (London, 1905); 159, 434.

LANDSDELL, H., *Chinese Central Asia* (2 vols., London, 1893); 432, 469, 470, 471, 482, 484, 485, 486, 490, 492, 494.
LAWRENCE, W. A., *The Valley of Kashmir* (London, 1895); 16, 72.
LE COQ, A. von, *Auf Hellas-Spuren in Ost-Turkistan* (Leipsig, 1926); 489.
—— *Von Land und Leuten in Ost-Turkistan* (Leipsig, 1928); 489.
LILLIE, A., *India and Primitive Christianity* (London, 1909); 159.
LITTLEDALE, St. George R., "A Journey across Central Asia" (*Geog. Jour.*, vol. III, 1894; p. 446); 496.
LONGSTAFF, T. G., "Glacier Exploration in the Eastern Karakoram" (*Georg. Jour.*, vol. XXXV, 1910, p. 622); 3, 4, 279, 322, 330, 371, 397, 398, 406.
—— "Himalayan Nomenclature" (*Geog. Jour.*, vol. LXXV, 1930, p. 44); 417.
LUDLOW, F., "The Shyok Dam in 1928" (*Himalayan Jour.*, vol. I, 1929, p. 4); 322.

MCGOVERN, W. M., *Introduction to Mahayana Buddhism* (London, 1922); 187.
MARIGNOLLI, Giovanni de, in YULE, *Cathay* (vol. III), and in *Sinica Franciscana* (A. van den Wyngeart, vol. I, p. 515); 491.
MARKHAM, Clements R., *Narratives of the Mission of George Bogle to Tibet*, etc. (London, 1876); 171, 179.
MARX, Dr. K., *The Book of the Kings of Ladak* (transl. quoted by Francke, *History of Ladak*); 171, 176.
MASON, Major K., "Completion of the Link connecting the Triangulations of India and Russia" (*Records, Survey of India*, vol. VI, Dehra Dun 1914, and *Geog. Jour.*, vol. XLIII, 1914, p. 664); 18.
—— "Exploration of the Shaksgam Valley and the Aghil Ranges, 1926" (*Records, Survey of India*, vol. XXII, Dehra Dun, 1928); 285, 375, 387, 392, 402, 403, 404, 406, 417, 449.
—— "Indus Floods and Shyok Glaciers" (*Himalayan Jour.*, vol. I, 1929, p. 10); 322.
—— "Johnson's 'Suppressed Ascent' of E 61" (*Alpine Jour.*, vol. XXXIV, 1922, p. 54); 394.
—— "Nomenclature in the Karakoram" (*Geog. Jour.*, vol. LXXVI, 1930, p. 142; and discussion, p. 148); 417.
MEINERTZHAGEN, Col. R., "Ladakh, with special Reference to its Natural History" (*Geog. Jour.*, vol. LXX, 1927, p. 129, and discussion following by correspondence with Capt. B. K. Featherstone, *ibid*, p. 595); 163.
MIR IZZUT OOLAH, an agent of Moorcroft (A report in *Jour. Roy. Asiat. Soc.*, 1842); 404.
MIRZA MUHAMMAD HAIDAR, *Tarik-i-Rashidi* (The Annals of Rashid), *1544*. (English version ed. by N. Elias, translation by Sir E. Denison Ross, London, 1895); 22, 44, 489, 492.
MONTGOMERIE, T. G., "On the Geographical Position of Yarkand," etc. (*Jour. Roy. Geog. Soc.*, vol. XXXVI, p. 157); 277.
MOORCROFT, W. and TREBECK, G., *Travels in the Himalayan Provinces of Hindustan and the Punjab, 1819–1825* (ed. H. Hayman Wilson, 2 vol., London, 1861); 14, 72, 135, 164, 224, 226, 277, 321.
—— "Notice on Khoten, from Papers of the late M. W. Moorcroft" (*Jour. Roy. Geog. Soc.*, vol. I, 1831, p. 238); 423.

NEVE, Dr. A., *Tourists' Guide to Kashmir, Ladak, Skardo*, etc. (VII. ed.; Lahore, 1908); 12.

NEVE, Dr. A., *Thirty Years in Kashmir* (London, 1913); 21, 40, 45, 56, 66, 103, 406.

Nomenclature (the Editor, *Geog. Jour.*, "Mountain Names on the Indian Border," *Geog. Jour.*, vol. LXXIV, 1929, p. 274); 417.

NOTOVITCH, N., *La Vie Inconnue de Jésus Christ* (Paris, 1900); 20, 216, 222, 223.

ODORICO DA PORDENONE (in YULE, *Cathay*, vol. II., also edition by G. Pullé, Milan, 1931, and in Van den Wyngaert's *Sinica Franciscana*, vol. I, p. 381); 491.

OLIVEIRA, Joao de (see WESSELS, C.); 163.

OLIVER, Captain (see LONGSTAFF, T. G.); 322, 397.

PAMPANINI, R., "La Flora del Caracorùm" (*Relazioni Scientifiche della Spedizione De Filippi*, Series II. vol. X; Bologna, 1930); 298, 310, 360, 508.

PARRAUD, J. P. et BILLICOQ, J. B., *Voyages au Tibet, faits en 1625 par le Père d'Andrada*, etc. (traduits par....; Paris, l'an IV, 1795–6); 135.

PELLIOT, P., *Mission Pelliot en Asie Centrale* (by various authors, 12 vols. in 4° and 8°; Paris, 1920–30); 489.

PENCK, A., "Zentral-Asien" (*Zeitschrift d. Ges. f. Erdkunde*, 1931, p. 1); 489.

PETERKIN, C. Grant (see WORKMAN); 3.

POLO, Marco, see YULE, Col. Sir Henry.

PREJEVALSKY, Col. (Gen.), Letters in *Proc. Roy. Geog. Soc.* (vol. VII, 1885, p. 807); 462. (And see DELMAR MORGAN.)

PUINI, C., "Il Tibet" (*Mem. Soc. Geog. Ital.*, vol. X; Roma, 1904); 25, 43, 135, 136.

PURDON, W. H., "On the Trig. Survey and Phys. Configuration of the Valley of Kashmir" (*Jour. Roy. Geog. Soc.*, vol. XXXI, 1908, p. 14); 18.

REINTHAL, Capt. (see in H. von SCHLAGINTWEIT'S *Reisen*; vol. IV, pp. 367–8); 494.

RÉMUSAT ABEL, *Histoire de la ville de Khotan, tirée des Annales de la Chine* (Paris, 1820); 490.

RHYS DAVIDS, T. W. (and C. A. F.), *Dialogues of the Buddha* (3 vols., London, 1899–1921); 106, 118.

RICKMER-RICKMERS, W., "The Alai Pamirs in 1913 and 1928" (*Geog. Jour.*, vol. LXXIV, 1929, p. 209); 489.

ROCKHILL, W. Woodville, *The Land of the Lamas* (New York, 1891); 120, 136, 156, 179, 197, 464.

—— "A Journey in Mongolia and in Tibet" (*Geog. Journ.*, vol. III, 1894, p. 357); 120, 152.

ROERICH, N., *Altai Himalaya* (New York, 1929); 223, 294.

ROERO DI CORTANZE, O., *Ricordi dei Viaggi al Cashemir, Piccolo e Medio Tibet e Turchestan* (3 vol., Turin, 1881); 15, 31, 111, 159, 165, 169, 209.

ROSS, Sir E. Denison, *A History of the Moghuls in Central Asia* (London, 1898); 489.

RUBRUQUIS, W., *The Journey of W. of Rubruk*, etc., 1253–5, transl. and ed. by W. W. Rockhill (*Hakluyt*, London, 1900); and F. A. Van den Wyngaert, *Sinica Franciscana*, vol. I (Florence, 1929); 135, 428, 491.

SARAT CHANDRA DAS, *Journey to Lhasa and Central Tibet*, ed. by W. W. Rockhill (2nd Ed., London, 1902); 136, 189, 197.

SCHLAGINTWEIT, Adolf von (see SCHLAGINTWEIT, Hermann von); 277, 493.

SCHLAGINTWEIT, Emil von, *Le Bouddhisme au Tibet* (transl. from the English by L. de Milloué; Ann. du Musée Guimet, III; Paris, 1881); 176, 208.

SCHLAGINTWEIT, Hermann von, *Reisen in Indien und Hochasien* (4 vols., Jena, 1869–80); 22, 40, 155, 159, 165, 277, 309, 322, 344, 395, 412, 417, 424, 425, 436, 493, 494.

SCHOMBERG, Lieut.-Col. R. C. F., " The Climatic Conditions in the Tarim Basin " (*Geog. Jour.*, vol. LXXXV, 1930, p. 313); 489.

SHAW, R., *Visits to High Tartary, Yarkand and Kashgar* (London, 1871); 4, 5, 165, 278, 321, 395. 397, 424, 432, 475, 483, 494.

—— " A Prince of Kashgar on the Geography of Eastern Turkistan " (*Jour. Roy. Geog. Soc.*, vol. XLVI, 1876, p. 277); 395, 483.

SHOWERS, D. C., *Land-Magnetic Observations* (Publ. by the Magnetic Dept. of the Carnegie Institution, Washington, D.C., 1910); 504.

SIMPSON, W., *The Buddhist Praying Wheel* (London, 1896); 118, 120, 187.

SKRINE, C. P., *Chinese Central Asia* (London, 1926); 469, 484.

—— " The Alps of Qungur " (*Geog. Jour.*, vol. LXVI, 1925, p. 385); 484.

SPOLETO, H.R.H. Prince Aimone of Savoia-Aosta, Duke of, " The Italian Expedition to the Karakoram in 1929 " (*Geog. Jour.*, vol. LXXV, 1930, p. 385); 375, 405, 449.

SPRANGER, J. A., " Operazioni Geodetiche," etc. (in vol. I, Series I of *Relazioni Scientifiche della Spedizione De Filippi*, p. 397); 370.

STEIN, Sir Aurel, *Chronicle of Kalhana, Rājataraṅgiṇī* (2 vols., Oxford, 1900); 13.

—— " Memoir on Maps illustrating the Ancient Geography of Kásmīr " (Reprint from *As. Soc. of Bengal*, vol. LXVIII, 1899); 13.

—— " Hātim Tilawōn, Kashmiri Stories and Songs " (*Indian Text Series*, 1923); 176.

—— *Ancient Khotan* (2 vols., Oxford, 1907); 454, 476, 489.

—— *Ruins of Desert Cathay* (2 vols., London, 1912); 165, 454.

—— *Serindia* (4 vols. and Atlas, Oxford, 1921); 489.

—— *Innermost Asia* (3 vols. and Atlas, Oxford, 1928); 489.

—— " Innermost Asia; its Geography as a Factor in History " (*Geog. Jour.*, vol. LXV, 1925, pp. 377 and 473); 489.

—— " Johnson's Map and the Topography of the K'un-lun, South of Khotan " (*Alpine Jour.*, vol. XXXIV, 1922, p. 62); 394.

STOLICZKA, Dr., of the Second Forsyth Mission (see FORSYTH, Sir T. D.); 297, 424.

STRACHEY, Capt. H., " Physical Geography of Western Tibet " (*Jour. Roy. Geog. Soc.*, vol. XXIII, 1853, p. 1); 4, 38, 165, 223, 288, 313, 321.

STRACHEY, R., " On the Physical Geography of the Provinces of Kumaón and Garhwál " etc. (*Jour. Roy. Geog. Soc.*, vol. XXI, 1851, p. 57); 310, 313.

SYKES, Gen. Sir Percy and Miss Sykes, *Through Deserts and Oases of Central Asia* (London, 1920); 469.

TENANI, M., " Misure di Magnetismo Terrestre eseguite in Asia Centrale " (in vol. II, Series I of *Relazioni Scientifiche della Spedizione De Filippi*; Bologna, 1929, p. 155); 504.

THOMSON, Th., *Western Himalaya and Tibet* (London, 1852); 28, 31, 43, 45, 67, 70, 165, 277, 285, 310, 321.

—— Letter in *Jour. Roy. Geog. Soc.* (vol. XIX, 1849, p. 25); 279, 321, 322.

TREBECK, G., see MOORCROFT, W.

TRINKLER, Dr. E., *Im Land der Stürme*, 1927–28 (Leipsig, 1930); 279.

—— " Die Lobwüste und das Lobnor Problem," etc. (*Zeit. der Ges. f. Erdkunde*, 1929, p. 353); 489.

—— " Tarimbecken und Takla-makan-Wüste " (*ib.* 1930, p. 350); 489.

TROTTER, Sir H., " On the Geographical Results of the Mission of Kashgar, etc., 1873–4 " (*Jour. Roy. Geog. Soc.*, vol. XLVIII, 1878; p. 173); 404.

TROTTER, Capt. H., "Account of Survey Operations in Eastern Turkistan (1873–4)" (*Records Survey of India*, 1915, vol. VIII, Part I); 479.

TURNER, S., *An Account of an Embassy to the Court of the Teshoo Lama in Tibet* (London, 1800); 152.

UJFALVY, Ch. de, *Les Ariens au Nord et au Sud de l'Hindou-Kouch* (Paris, 1896); 43.

UP DE GRAFF, W. F., *Head Hunters of the Amazon* (London, 1922); 428.

VALIKHANOFF, Capt., see in H. von SCHLAGINTWEIT'S *Reisen* (vol. IV, p. 358 sgg.); 494.

VIGNE, G. T., *Travels in Kashmir, Ladak, Iskardo*, etc. (2 vols., London, 1842); 14, 21, 28, 40, 43, 44, 45, 47, 53, 56, 58, 65, 104, 135, 164, 277, 284, 320, 406.

VINCIGUERRA, D., "Pesci raccolti da G. Dainelli nell' Indo Balti" (in *Relazioni Scientifiche della Spedizione De Filippi*, Series II, vol. X; Bologna, 1930); 81, 360, 508.

VISSER-HOOFT, J., and VISSER, C., *Among the Kara-Korum Glaciers in 1925* (London, 1926); 434.

VISSER, Ph. C., "Die dritte niederländische Karakorum-Expedition" (*Zeit. der Ges. f. Erdkunde*, Berlin, 1930, p. 264); 3, 356.

—— "The Mountains of Central Asia and their Nomenclature" (*Geog. Jour.*, vol. LXXVI, 1930, p. 138); 417.

VISSER-HOOFT, J., "The Netherlands-Karakoram Expedition, 1929" (*Himalayan Journal*, vol. III, 1931, pp. 13 and 107); 294, 322.

WADDELL, L. A., *The Buddhism of Tibet, or Lamaism* (London, 1895); 111, 159, 187.

—— "The Motive of the Mystery-Play of Tibet" (*Actes du X-e Congrès Intern. des Orientalistes*; Geneva, 1894, Section V, p. 169); 159.

—— "Buddha's Secret" (*Jour. Roy. As. Soc.*, April 1894, p. 367); 187.

—— *Lhasa and its Mysteries* (London, 1905); 187.

WALLIS BUDGE, Sir E. A., *Amulets and Superstitions* (Oxford, 1931); 458.

WESSELS, C., S.J., *Early Jesuit Travellers in Central Asia, 1603–1721*—de Goes, de Andrade, etc. (The Hague, 1924); 135, 163.

WOLFF, Jos., *Travels and Adventures* (2 vols., London, 1860); 14.

WOOD, Col. H., *Exploration in the Eastern Kara-Koram and Upper Yarkand Valley*, etc. (Dehra Dun, 1922); 370, 394, 403, 407, 437.

—— "The Exploration of the Upper Yarkand Valley in 1914 by the De Filippi Expedition" (*Geog. Jour.*, vol. LIX, 1922; p. 375 (Note p. 379)); 399, 403.

WORKMAN, F. Bullock and W. Hunter, *Two Summers in the Ice-Wilds of Eastern Karakoram* (London, 1917); 3, 330, 345, 399, 400, 405, 406.

WYSS, Dr. R. (see VISSER); 3.

XAVIER, Jerôme, in P. Matteo Ricci, *Commentari della Cina* (ed. by F. Tacchi Venturi, Macerata, 1911); 135.

YOUNGHUSBAND, Capt. Frank E., C.I.E. (Col. Sir Francis E.), *The Heart of a Continent* (London, 1896); 3, 5, 375, 398, 405, 427, 432, 434, 438, 439, 440, 442, 449.

—— "The Problem of the Shaksgam Valley" (*Geog. Jour.*, vol. LXVIII, 1926, p. 225); 375.

YULE, Col. Sir Henry, *Cathay and the Way thither* (4 vols. ed. H. Cordier; Hakluyt Soc., London, 1915–16); 44, 135, 191, 403, 424, 490, 491, 492, 493.

—— *The Book of Ser Marco Polo the Venetian* (2nd Ed., 2 vols.; London, 1875;—3rd Ed. by H. Cordier, 3 vols., London, 1903–20); 72, 190, 201, 226, 412, 428, 443, 454, 464, 492.

GENERAL INDEX

Abdullah Khan *medresse* (Yarkand), 475
Afghanistan, Afghans, 2, 13, 15, 169, 231, 415
Aghil (Kirghiz encampment), 427, 453, 454, 455, 497
Aghil pass, 406, 442, 445
— ranges, 5, 375, 396, 403, 417, 434–50 *passim*
— Depsang, 392, 404
Agra, 493
Ahmed Shah, Rajah of Skardu, 40, 43, 44; dispossessed by the Sikhs, 45, 47, 53, 60, 179
Akbar, 13
Ak-Korum pass, 415, 437, 451, 458
Ak-Masjid, 459, 460
Akoi (Kirghiz tents), 427, 428, 431, 454
Ak Robat, 481, 482
Aksai range, 430
— -Chin plateau, 15, 277, 316, 360, 362, 423, 506
Aksakal (elder and public official), 442, 448, 460, 461, 468, 470, 471, 481, 483, 495
Ak-Su river and district, 463, 488, 494
Ak-Tag range (North of Kashgar), 493
Ak-Tagh camping place and range, 381, 384, 392, 421, 435, 437
Aktaglik Kirghiz, 493
Aktash glaciers, 330; records of their variations, 321; description, 365–6, 397
Alai range, 496, 504
Alchi monastery, 151–4, 156, 239, 240, 248, 250
Ali Bransa (on Siachen Glacier), 405, 406
Ali Sher Khan, Rajah of Karmang, 31
— — — Rajah of Skardu (and Khapalu), 44, 46, 47, 177, 201, 244, 406
Altin Tagh, 463
Amban (prefects in Sin Kiang), 464–94 *passim*
Amitabha, 108, 125
Amu Daria (Oxus), 490
Andijan, 500, 504
Araba (Central Asian carts), 480, 500
Arabs, invasion of the two Turkestans by, 491, 493
Arandu, 88, 89
Arghe (clan of Kirghiz), 432
Argon, 190, 252
Askole, 86
Asoka, 13, 106
Astor, 15
Atalik Ghazi (Yakub Beg); 165, 278, 396, 475, 494
Atbashi, 430
Atisha, 183
Aurangzeb, 13, 14, 178
Avalokita (Chenrezi), 108, 125, 137, 194, 197
Avitabile, General, 14
Awantipur, 75

Babur, or baber, 492
Badakshan, 44, 72
Baksum Bulak, 380, 382, 403, 417, 420, 421
Bakula, *kushok* of Spituk monastery, 183, 184, 187, 188, 205, 271
Balalak Dar, *tehsildar* of Karghil, 70, 105
Balkh, 491
Baltal, 20
Balti Bransa, 377, 378, 380, 417
Baltis, origin of, 43; description of, 52–3; anthropology, 81, 85; clothing, 95, 229; houses, 86, 143, 229; women, 89; dances, 175; marriage customs, 53; religious sects, 92–3; celebration of the Muharram, 53–6; likeness to Brokpas, 229; qualities as porters, 299, 412; build artificial glaciers, 256
Baltistan, 3, 15, 31, 34, 257, 351; history of, 43–5, 165, 177, 413, 492; Islam in, 56, 57, 92–3; Buddhism in, 96; population, 15;

climate, 25, 66–70; archery matches in, 66; legends of Alexander the Great, 90; animals of, 225; trade with Ladak, 103; trade-routes to Central Asia, 404, 405, 407
Baltoro glacier, 3, 33, 84–99 *passim*, 293, 313, 320, 327, 330, 345, 373, 379, 382
Barsak, or Farsang (Persian measure of distance on roads), 470
Basevi, Capt. J. P., 167
Basha valley, 79, 87–91, 256, 361, 506.
Basti Ram, see Mehta Basti Ram
Bazar Dara, 393, 440–5 *passim*, 450, 451, 455, 458
Bazgo, Bazgo Thang, 28,157, 158, 159, 178, 248, 250
Beg (Kirghiz chief), 422, 430, 432, 435, 439, 445, 448, 458
Besh Terek, 461, 462
Bhutan, 152, 162
Biafo glacier, 86, 87, 99, 320, 330, 403
Biagdangdo, 95
Bibi Miriam, 491
Bilaphond glacier and pass, 97, 405, 406
Bisil, 88
Bôdhisatvas, 106, 140, 154
Bokhara, 427, 428, 475, 491
Bombay, 11, 12, 74, 312, 410
Bon religion, pre-Buddhistic, 140
Bot Karbu, 138, 234, 235, 242, 244, 245, 246
Brahma, 125
Brahmaputra, 177, 425
Braldoh valley, 79, 84, 86, 87, 91, 97, 293, 320, 361, 506; hot springs in, 88, 256
Brebung monastery 140
Bride Peak (Baltoro), 86
Broad Peak (Baltoro), 382
Brokpa, 76, 175, 237, 238, 241; origin of, 83, 90; description of, 228, 229, 250
Buddhism, 106–14, 177, 222; figures and symbols, 57, 58, 60, 119, 125, 131, 140, 154, 194, 201, 214, 216, 232, 240
Bughra Khan, 491
Burdomal, 86
Burji, river, 48, 49
Burji-la, 40, 42, 49, 57, 90
Burma, 2
Burtze, description of, 298; where found, 301, 318, 327, 359, 364, 367, 373, 374, 378, 380, 445; scarcity of, 388, 390
Burtze Yokma, 301, 303, 304, 352
Burze, Burzil, pass, *see* Burji-la

Camels, Bactrian, 412, 413
Cascar, or Casigar, for Kashgar, 486
Caspian Sea, 490
Central Asia, *see* Turkestan, Eastern
Chaitiya, or Stupa, 114
Chajos Jilga, 414, 415
Chakpa, 86
Chamba, Maitreia, 108; statues of, 124, 137, 146, 147, 157, 194, 195, 201, 205, 206, 232
Chang (beer), 164, 175, 190, 197, 271, 316
Chang Chenmo, plateau and river, 15, 263, 276–92 *passim*, 322, 353, 354
Chang-la, 165, 166, 255, 269, 276–82 *passim*, 350
Chang Lung-la, 276
Changpas, 76, 83, 254, 261–9 *passim*, 284, 350, 351
Chang Thang (Chang Thung), 406
Chenrezi, Tibetan for Avalokita, *q.v.*
Cherchen river, 463
Chibra, 421, 422
Chiktan, 138, 234–339, 246; the castle, 242, 243; history, 242, 244
Chiling, Zanskar, 273, 274
Chimre, valley and monastery, 165, 207, 212, 261, 269, 270, 276, 280, 282
China, 430, 463, 490, 493
Chipchap river and valley, 306, 308, 312, 315, 320–2, 333, 354–70 *passim*, 356, 379–81, 394–6, 403, 413, 414, 417
Chirak Saldi, 421, 434, 438, 439, 442, 448.
Chogo Lungma glacier, 88, 97, 98, 99
Chorbat, 95, 404
Chortens; description of, 114–17; where found, 118, 120, 123, 137–58 *passim*, 193–223 *passim*, 245, 246, 269, 280
Chubi, 197, 200
Chumatang, 246, 256, 259
Chumos (nuns), 111, 112, 134, 142, 207
Chung Jangal (Tol Depsa), 288
Chutrun (hot springs), 87–8, 89, 90, 97

Dah, 231, 232, 233
Dal, the Srinagar lake, 13, 16, 74
Dalai Lama, 108, 112, 170, 181, 193, 493
Dalgleish, 414, 415

Dapsang, *see* Depsang, 309
Dara (Turki for valley), 435
Dardistan, 83, 90
Dards, 15, 43, 83, 143, 146, 229–44 *passim*, 292; principalities in Ladak, 177; bridges made by, 103; tombs, 202
Daria (Turki for river), 435
Darjeeling, 12
Darwaz Sarikot, 382, 420
Daulat Beg uldi, 413, 492
Debring Valley, 167, 168
Dehra Dun, 12, 16, 42, 409, 495, 501–4
Deldan (king of Ladak), 177, 203, 205
Delegs (king of Ladak), 177, 178
Delhi, 11, 12
Deosai plateau, 40, 57, 83, 90, 259, 263
Depsang peak, 308, 309, 331, 334
Depsang plateau, 4, 502; observations on, 227, 327, 393, 504, 505, 506; height of, 304; journey to, from Leh, Ch. IX; description, 308–9; vegetation and fauna, 310–11; base camp on, 311, 349, 354, departure from, 408–14; merchant and pilgrim caravans, 311–12; climate, 313–15; exploration of, 316; country round, 318, 346, 354, 379; routes to, 320, 352, 362, 363, 364, 368, 369, 393
Dereas Kara (for Kara Kash, *q.v.*), 423
Devanagiri script, 133
Devas (genii of the air), 108
Digger-la (Laswan), 276
Djani Bôdhisatvas, 108
Djani Buddhas, 108
Dogra, 15, 46, 47, 137, 142, 143, 164, 169, 170, 214, 244, 250, 261, 270
Domurdo river, 87
Dong Lung, 356, 357, 362
Dong Yelak (Nya Yakmik), 290
Dorje (symbolic sceptre), 125
Dragspa (king of Ladak), 197
Dras, river and valley, 18, 22, 27, 28, 76, 104, 246
Dras, village, 17, 21–9 *passim*, 76, 83, 169, 250, 352, 502, 505
Drilbu (little bell of religious ceremonies), 125
Dudma Tag, 457, 458
Dugpa (Red Lama Sect in Ladak), 183
Dugskar, 205
Dunga-den, *see Chortens*
Durgul valley, 282, 292
Dzungaria, Dzungari, 493, 494

Eishmakam monastery, 75
Eski Shahr (ruins of old Kashgar), 486, 492

Fah Hian (Buddhist pilgrim), 490
Farsang, or *barsak* (Persian measure of distance on roads), 470
Ferghana, 425, 493, 496, 502
Ferozpur, 15
Fotai or *Fote* (mileage on Turkestan roads, and milestones), 469, 471, 482
Fotu-la, 138, 139, 228, 229, 234, 246
Futai (Governor-General of Sin Kiang), 463

Gangri range, 275
Garhwal, 2
Gartok, 179, 225
Garzok monastery, 255, 260–3, 267
Gasherbrum, 373, 379, 382
Gautama Buddha, 108
Gelugpa (yellow-cap sect of monks), 111, 134
Gilgit, 15, 56, 90, 242, 250, 396, 480, 495, 505
Gobi desert, 463, 491
Gol, 91
Gonpas (monasteries), general description, 123–5; where found, 205, 231, 239, 240, 245–8 *passim*, 260, 267, 280
Grugurdo, 230
Gulab Singh, 15, 22, 44, 45
Gulcha valley, 499
Gulmarg, 75
Gumber river, 18, 19, 21, 22, 23, 25
Gunderbal, Kashmir, 18, 19
Gustavson (missionary at Skardu), 43, 62
Gya, 163, 167, 168
Gyalpo (the kings of Skardu), 43, 270
Gyapshang, *see* Yapchan, 396

Han-Hai desert, 463
Hanjore, 94, 95
Hanle, 163
Hanu, 404
Hari Parbat, 74

Hashmatullah Khan (*waẓir-i-waẓarat* of Baltistan and Ladak), 23, 49, 51, 57, 70, 90, 95, 171, 245, 251, 271, 272
Hassan (son of Bughra Khan), 491
Haython I (king of Armenia), 492
Hem-Babs (*see* Dras village), 25
Hermits and Anchorites, 192
Himalaya, 5, 75, 76, 99, 171, 178, 223, 245, 255, 345*n*, 501, 502, 507; glaciers of, 234, 352, 397; gravimetrical observations on, 2, 503, 504; rivers in, 158, 260, 425*n*; suspension bridges in, 30
Himis monastery, 109, 110, 128, 149*n*, 167, 194, 207; *kushok* of, 162, 166, 175, 183, 187; description of, 208, 213–21; Notovich's visit, 222, 270, 280, 478
Himis Shukpa monastery, 149, 248
Hinduism, Vedism, 106, 222
Hindu Kush Range, 15, 417, 495
Hispar Glacier, 330, 403
Hiuen Tsiang (Chinese pilgrim), 490
Ho-nan, 156
Hsi-an (Hsi-ngan), 156
Hsien-hwan (Chinese official), 495
Hundes, 164
Huns, *see* Uighurs
Hunza, 15, 56, 279, 406, 417, 434, 442
Hushe valley, 94, 95

Ilchi (Khotan), 4, 395
Ili Su pass, 448
Ilyas (Khizr Khogia), 492*n*
Inchin valley, 282
Indus river and valley, 3, 28; at Skardu, 37–9, 45, 62, 66, 81, 101–4, 146; at Leh, 163*n*, 180, 202, 203, 280; at Nemo, 255; great lakes of, 83, 244, 249; monasteries on, 151, 156, 246, 248; suspension bridge, 30; population of, 76, 99, 229, 242, 254; valleys and tributaries of, 34, 138, 156, 157, 158, 284, 395; upper valley of, 265, *see also* Rong.
Irkistan, 496–8
Ishak Art pass, 451, 458
Iskander, son of Sultan Said, 44
Iskardo, *see* Skardu, 45
Islamabad, 75
Italia Col, 400, 401
Izgang, a monastery, 240

Jagatai Khan and Dynasty, 491, 492
Jai Konma, 427, 429
Jammu, 15, 51, 105, 165, 179, 434
Jamyang Namgyal (king of Ladak), 177, 244
Jehanjr, 13
Jenghiz Khan, 454, 491–3
Jetsum Mila Raspa (wandering monk and poet), 128, 187
Jhelum, river, 16, 19
Jigmet Namgyal (king of Ladak), 179

K2, 86, 309, 382
K22, 295, 308
K24, 308
K32, 295, 308, 373, 382
Kahgyur (Lamaic canons), 114, 131, 132, 191, 194, 205, 216
Kahu (charm boxes), 155
Kailas range, 275
Kakium, 263, 352
Kalak (turban of Kirghiz women), 428
Kalatse, 228, 247–50, 257, 272, 506; bridge of, 143, 145
Kalmucks, 428, 493, 494
Kalong Lobzang Sewang (*ẓaildar* of Leh), 193
Kamaruddin Dughlat, 492
Kand (capital of an agricultural district, in Turkestan), 470
Kanishka, 13
Kansu, 493
Kantel, Mount, *see* Zoji-la
Kapter Khana (Shukpa), 290
Karachi, 312
Kara-Kash, valley and river, 277, 308, 353–62 *passim*, 396, 406, 421–8 *passim*
Kara Khitai, 491, 493
Karakoram pass, 276, 363; Chapters XIII, XIV, XV, *passim*; traversed in history, 44, 277–9, 492
Karakoram range, location and extent of, 3, 5, 285*n*, 402; game found on, 255, 310*n*; glaciers of, 95, 234, 330, 367, 402, 407, 507; variations of spelling of name, 415; observations on, 503, 504, 506
Karash Tarim, 440

Karataglik, 493
Karbu, 27, 138, 139, 246
Kardo (*see* Skardu), 45
Kardong-la, 254, 276, 277, 278, 409, 410
Karghalik, 394, 425*n*, 448, 451, 461, 463, 469–78 *passim*; officials of, 458, 462, 464; description of, 464–8
Kargil (in the Purig district, *q.v.*), 166, 237, 244; description of, 104–5; fort at, 105, 179, 250; officials of, 23, 25; the expedition at, 70, 72, 105, 236, 502; routes to, 27, 104, 136–8, 228, 235, 245; investigations of Purig from, *see* Purig.
Karlik Dawan, 425
Karmang, 29–31, 103, 104
Kartse, 244
Kashgar, city and district, expedition to, 5, 502, 504; position of, 463, 479*n*, 480–8; officers, etc., of, 21, 22*n*, 44, 177, 278, 464; previous visits to, 165, 277, 404; plan of, 487; history of, 490–4
Kashgar range, 443, 484
Kashgar river, 463, 496
Kashmir, 11; history of, 12–14, 56; travellers to, 14–15; present state, 15–16; expedition from, 17, 74–9 *passim*; Buddhists in, 135, 151, 152, 156; rulers and government of, 162–5 *passim*, 171, 178, 183*n*, 193, 202
Kasigarh (for Kashgar), 486
Kataklik (Salakpa), 293, 352
Katlun Chormo, 292
Keria river, 425
Khalastan, 454
Khal Chuskun valley, 427, 432
Khan Yeilak, 454
Khapalu, 65, 95, 391, 404*n*, 406; history of, 44, 45; rajahs and duke of, 90, 93, 177*n*
Khizr Khogia, 492
Khoja Buzurg Khan, 494
Khoja Hidayadulla, 493
Khoja Ishak, 493
Khoja Muhammed Amin, 493
Khojas, 493, 494
Khotan, district and river, 425, 462, 463, 482–94 *passim*; previous visits to, 277, 278, 321, 395
Khumdan (for Shayok river), 284
Kibitka, tent of the Russian Kirghiz, 428
Kichik Burelik, 445
Kien Lung, Chinese Emperor, 493
Kilian Dawan, 425
Kirghiz, race and customs, 411–12, 427–43 *passim*, 454, 491–8 *passim*
Kirghiz Jangal, pass and camp; 383, 396, 433–9 *passim*
Kiris, 34, 91; mosque, 92, 93, 99, 240, 275
Kisil Bazar, 482
Kisil Lungur, 305, 316, 352, 353
Kisil-Su, 492, 496, 497
Kohna Shahr (Yarkand), 472, 477
Kokart Dawan, 432
Koko-nor, 156
Kök-Robat, 480, 481
Kök-Yar, 382, 458, 459, 461, 493
Kondus, 79, 91, 97, 256, 361, 506
Koram (circumambulation of sacred objects and places), 118, 191
Korkundus, 97, 98, 99
Korophon, 87
Kosh, a group of Kirghiz families, 430
Koshluk, 491
Koumis (fermented mare's milk), 430
Krishna (Kishen Singh), Indian Surveyor, 479
Kuardo, 61, 62
Kuen Lun, 3, 381, 394, 420, 421, 425, 434–9 *passim*, 451, 452
Kufelang, 380–404, 417–21, 434–7 *passim*
Kuhna Shar, 486
Kukalan Aghze, 453
Kukalan Dawan, 394, 451–5
Kulan Arghe, 451, 453
Kulan (Turki for *kyang*, wild ass), 437, 438
Kulan Uldi, 421, 437
Kulu (Collahor), 164
Kumaon, 2
Kumdan glaciers, 320; historical data on their variations, 321–2; description, 364–6; 396–8, 414
Kunamu, 75
Kundun Tso, 320
Kungur Peak, 484
Kunis, 93
Kunjut raiders, 279, 406, 432, 434, 442, 451, 455, 456
Kurim, private religious service, 192–3

Kurit, Kurit-la, 236, 237
Kuropatkin, General, 496
Kurultai (a Kirghiz parliament), 430
Kushan (*see* Yuechi), 490
Kushoks (incarnated Lamas), 150, 156, 162, 183, 261, 478; description of, 112, 134
Kutzurah, 83, 244
Kyang, 225, 226, 438

Ladak, 3, 15, 34, 164, 249, 351; capital of, 11, 262; history of, 43–5, 165, 176–81, 244; Lamaism in, 56, 106–12, 125, 131, 135; trade with Baltistan, 103; mission in, 171; calendar, 179*n*; king of, 179–83, 271; Ladaki tea, 190*n*; sacred plays in, 209; agriculture, 223–5; animals of, 224–7; ruins in, 242
Ladak range, 146, 162, 165, 275–7
Ladakis, description of, 164; anthropology, 34, 190; food, 72; clothing, 95, 154–6, 265; sport, 66; monuments erected by, 119; polyandry, 136; dances, 159, 172–3; houses, 193; cremation, 197–201; musicians, 253; qualities as porters, 299, 301
Lahore, 12, 42, 43, 409*n*, 425, 478, 503
Lahul, 135, 165, 169, 170
Lamaism (Lamaist Buddhism), 106–11; hierarchy, 111–13, 118; the lucky symbols, 119; compared with Roman Catholicism, 134, 170*n*; case of dereliction in, 205*n*; and Islam, 238–40
Lamayuru, 116–18, 166, 239, 245–7, 261, 502; description, 139–44
Langar, 499
Laowchi pass, 276
Laswan-la, 276, 277
La-tags (*see* Ladak), 105
Lde (king of Ladak), 197, 201
Leh, 5, 11, 163–227 *passim*, 251, 271–316 *passim*, previous visitors to, 163–5; work at, 166–9, 254, 502, 505; the city and its residents, 169–71; Moravian mission, 143, 170–1; festivals and displays, 172–5, 177; Dogra fort, 178–80, 250; castle, 181, 183; religious ceremonies, 190–1; temples, 194; Dard tombs, 202; Moslem cemetery, 203, 205; climate, 223; re-organization of the caravan in, 227; Moslems and Hindus in, 252; *see also* Ladak
Lha, 108, 184
Lha-chen (a dynasty of Ladak), 177
Lha-mo (a Goddess), 108
Lhasa, 118, 167, 169–70*n*, 265; in history, 44, 45, 177–9, 493; lamas of, 108, 111, 112, 197; temple at, 123; feasts at, 189*n*; dancers from, 175; manuscripts at, 216, 222*n*
Lhatayul (*see* Ladak), 105, 164
Lhato (shrines), 119, 202, 246, 269, 281
Li (Chinese mileage), 469
Lidar valley, 75
Likir monastery, 121, 129, 156, 157, 183, 248, 250, 270
Ling, 248
Lingzi Thang, 277, 285, 288, 313*n*, 354, 357, 359, 362, 423
Lob-nor, 394, 463, 489
Lolophond glacier, 405
Losava, a pilgrim, 239
Lotsun, 236, 237
Lumsu, 237, 238
Lungma-chhe (second western tributary of the Yarkand valley), 387, 392
Lunkha, 94, 95

Mafa; Central Asian cart, 469, 478
Mahalla (group of houses in Turkestan), 470*n*
Mahayana Buddhism, 106, 184
Maitreia, *see* Chamba
Makdum Azam (founder of the Khojas), 493
Mani Korlo (*see* Prayer-wheels), 120*n*
Mani walls, description, 117, 118; where found, 138, 139, 143, 151*n*, 158, 202, 203, 223, 246, 381
Manushi Buddhas, 108
Marol, 229, 230, 235
Marshalang, 61
Marsimik-la, 276
Martand, 75
Mar-yul (*see* Ladak), 105
Masherbrum, 94
Maulai, 434
Mazar (a holy tomb), 61, 62, 457
Mehta Basti Ram (officer of Zorawar Singh), 45, 178

Meru, Mount, 114
Metchuhoi (Mechoi in map of India), 23
Mila Raspa (*see* Jetsum Mila Raspa), 187
Mingbashi (head of a thousand), 454
Ming-ti (Chinese Emperor), 490
Minimurg, 23
Mirab (superintendent of irrigation waters, in Turkestan), 470
Mir Sheik Dana-Ali-Dana (Islamic missionary in Baltistan), 66
Mir Wali (ruler of Yasin), 396
Mir Yahya (builder of mosques), 66
Mirza Aba Bakr, 486, 492
Mirza Muhammed Haidar (*see* Bibliographical Index)
Mithridates, 490
Moghulistan, 491, 492
Moghuls, 493
Mohammed Shah (son of Ahmed Shah, Rajah of Skardu), 45
Mon, 176, 253, 254, 292
Mongol, Mongolian, 254, 264, 265, 411, 428, 430; armies, 311, 454*n*; 491, 492
Mongolia, 156*n*, 178, 190, 443, 463
More, Rupshu plateau, 167
Muhammad Shah, King of Kashmir, 22
Mulbek, 58*n*, 239, 245; monuments at, 137, 246, 247; valley, 235, 236
Murgo, 293–302 *passim*, 306, 312, 316, 352, 409
Mushki river, 22
Mustagh range and passes, 87, 97, 438
Mustagh Ata, 443, 484
Mutaiun, 23, 76

Nagar, 15, 279, 406, 417, 434
Nagas (genii of the Earth), 108
Naglug (king of Ladak), 146
Namdah (felts of Turkestan), 46, 430, 457, 462, 466, 468
Namgyal (a dynasty of Ladak), 177, 178
Namgyal Tsemo, 126, 191, 194–9, 201, 216
Namika La, 137, 228, 234, 235, 246, 247
Nartang, 133
Naruda, 108
Nasha (liquor made from koumis), 430
Natha Singh (*tehsildar* of Leh), 70, 171
Nepal, Nepalese, 131, 162, 169, 216
Nestorians, 490, 491
Ngagwand Choszang (former treasurer of Himis), 222
Ngnari Giongar, Ngari Khorsum, 164
Nieito, capital of Little Poliu, 44
Nikaya (Dialogues of the Buddha), 118
Nima, 255, 267
Nimu, 158, 159, 248
Niyma Namgyal (king of Ladak), 163
Nono Skalzang (*lambardar* of Leh), 316, 318
Northern Indus (Shayok), 285
Nubra valley and river, 3, 5, 95, 275–85 *passim*, 294, 395, 406, 410*n*
Nubra-Shayok watershed, *see* Sassir Range
Nubra-Tso (Kundun), 320
Nun Kun range, 28
Nurbashi, 92, 93
Nur Jahan (wife of Jehanjr), 13
Nurla (Snurla), 146, 150, 248
Nya Yakmik (Dong Yelak), 290, 291
Nyingma (Red-cap sect of monks), 111

Obi, 430
Oë (house of Turki agricultural labourer), 470
Olopan (Nestorian missionary), 490
Olting (in Skardu basin), 57
Olting (in Suru-Dras valley, Olthingthang), 28
Om mani padme hum (*mantra* of Avalokita), 108, 117, 120, 377
Onbashi (head of ten), 454, 460
Oprang valley, *see* Shaksgam
Osh, 496, 500, 504
Otansu, 461
Otmal Yagash, 454, 455
Ourdus, 230, 231
Oxus (Amu Daria), 476, 490

Pabbu (Ladaki foot-wear), 154, 174, 299
Padma Sambhava, 125, 209
Pahlgam, 75
Paien-i-kotal (*see* Zoji-la), 21
Paiju, 86, 87
Pakora, 86
Pakpu Dara, 455
Pakpus, Pakpos or Tagliks, 454–8
Pamir, 258, 307, 396*n*, 463, 481, 502
Pan Ch'ao, Chinese general, 490

Pandras, 23
Pangkong lake, 167, 254, 255, 264–9 *passim*, 276, 277, 506
Parasang, 470*n*
Parkutta, 34, 101
Pashkyum, 28, 137, 178, 245
Pashmina wool, 225, 264
Pathan, 13, 14
Peak 50/52 E (24240), 309, 318, 333
Pekin, 478, 491
Perak (woman's head-ornament), 156
Persia, 490
Persian Gulf, 312
Peshawar, 14
Peter, Dr. F. E. (head of Moravian mission at Leh), 171, 187
Pharon, 95, 97
Phayang valley, 162; monastery, 113, 175, 191, 249, 250, 270; mystery play at, 158–61, 247, 267
Pindobal, 40, 41
Pin Tower, 57
Pir Panjal, 12, 17, 75, 76, 507
Pitaka (Buddhist text), 118*n*
Pokar (Mulbek), 244
Poliu, Great and Little (*see* Ladak and Baltistan), 44
Posgam, 470, 484
Potala, 181
Prayer-wheels (Mani Korlo), 120–2, 140, 150–2
Psar, 460, 461
Puga valley, 255, 256, 259, 361
Pulo (Pu-lu), 379, 414
Punjab, 15, 53, 169, 252, 262, 312, 425
Purang, 239
Purig district, 28, 237–45, 250, 506; animals of, 224, 225; geology of (at Kargil), 244; capital of, *see* Kargil
Purig people, 76, 83, 241, 508; religion, 96, 238; language, 238; musicians, 253

Rabsal (balcony in Ladaki houses), 233
Ram Gopal Mehta (*tehsildar* of Skardu), 51, 57, 70
Ranjit Singh, 14
Rashid (son of Sultan Said), 492, 493
Raskem (*Rastkam*), Turki for mines, 435*n*
Raskem Daria or upper Yarkand river, *q.v.*; 398, 435–52 *passim*, 455
Rasul Galwan, Ghulam, assistance of, to expedition, 166, 227, 298, 318, 408, 478; on previous excursion, 397; portrait of, 495
Rawal Pindi, 12, 74, 223, 391
Rebo, Changpa tent, 263, 269
Red Sea, 312
Remo, Remu, *see* Rimu
Rigzon monastery, 149, 150, 183, 248, 250, 270
Rimu (Remo, Remu) glacier, 309, 506; origin of name, 398; in Indian Trigonometrical Survey Map, 4, 394; exploration of, 316, Chap. XI, 366–9; topography of, Chap. XIV; geographical features, 399–401; height of, 99; motion of, 322*n*, 397; front, 324; lower portion, 324–8; moraines, 329–33, 402; tributary glaciers, 330–1; confluence with northern branch (*q.v.*), 333–4; upper circus of, 341–3; bad weather on, 343–6; descent of, 346–7; rivers from, 275, 380, 394, 396, 403 (*see also* Shayok *and* Yarkand); watershed of, exploration of, Chap. XIII
— Northern branch, exploration of, 333–40, 373–80; geographical features, 400–3; source of Yarkand river, 338, 368, 373; saddle at head of, 339–40, 402; offshoot of, 336–7, 376
— Southern branch, 318, 319, 323, 327; exploration of, 347–8; geographical features, 402
Romkhang (furnaces for cremation), 197, 280
Rong, or Upper Indus Valley, 256–9, 267
Rudok, 164, 167, 225
Rukchen valley, 167
Rumbok (Rumpak), 272, 273, 274
Rupshu plateau, 167, 197, 225, 254–65 *passim*, 272, 506

Sabu valley, 280
Sacae, Scythae (*see* Scythians), 490
Sagarkhoad (Sagar-khoard, Skarkod; *see* Skardu), 45
Saigan river, 483
Sakti, Saktism, 106, 108
Sakti village, 269, 280, 281
Sakya sect of Lamas (red), 183
Salakpa (Kataklik), 293, 294, 295, 296, 297, 316, 321

Salt Lake, Rupshu plateau, 260
Saltoro, 79, 91–7 *passim*, 361, 405, 506
Saman, 491
Samarkand, 475, 492, 493
Samtan monastery, 149
Sanjak, 233–5, 246
Sanju Dawan, 311, 384, 425
Sankar monastery, 127, 183, 188, 189
Sarikol, 434, 454, 484
Sarts, 166
Saspul, 150, 151, 154, 156, 248
Sassir (Sassar), Sassir-la, 276, 296, 299, 320, 321, 352, 414; pass to Nubra valley, 279, 285, 294, 297, 395, 410*n*; height, 304
Sassir Range (Nubra-Shayok watershed), 288, 295, 297, 373, 379, 402, 417
Satpor, valley and river, 46, 48, 49, 57, 61; lake, 58–60; oasis, 60, 65, 96
Scythians, Scytae, 428, 490
Sengge Namgyal (king of Ladak), 151, 177, 181, 187, 203, 207, 208
Seoji La, Shur-ji-la, *see* Zoji-la
Seward glacier, Alaska, 330
Sgomang chorten, 197, 200
Shah Hamadan mosque at Srinagar, 65
Shahidulla, 396, 398, 425, 427, 434, 437; fort of, 424
Shah Jahan, 13
Shakar, 235, 236
Shaksgam, valley and river, expedition to, 5, 375, 380, 388, 391; abandoned, 442, 448, 449; other expeditions to, 398, 402; routes to, 405, 406; raiders in, 434; unknown in Drew's map, 437*n*
Shana river, 483
Shapiyon, 75
Shargol, 137, 239, 245, 246
Shayok river and valley, 79, 165, 166, 227, 316, 409, 506; previous information on, 3–5; in history, 44, 45, 103, 391, 404; position of, 275–9 *passim*; journey up and description of, 91–9, 257, 282–97 *passim*, 350–6; results of survey work in, 393–9 *passim*; winter in, 228; source of (Rimu glacier, *q.v.*), 318, 323, 346, 362; glacier dams, 320–2, 362–6, 414; junction with Indus, 34, 265; tributaries of, 405; *and see* Chipchap
Shayok village, 276, 283, 286; description of, 282; inhabitants of, 284, 350
Sheh, 203–7 *passim*, 280
Shen-si, 156, 493
Sherpigang glacier, 97, 98, 99
Shiah, 56, 92, 93, 203, 434, 454
Shigar, valley and river, 37, 39, 48, 61, 79, 87; village and oasis, 33, 61–5, 83; mosques, 65–6, archery match, 66
Shigatse, 108, 111, 112, 133, 177, 197
Shimashad pass, 434
Shing-la, 273, 274
Shi-yok (*see* Shayok), 320
Shukpa (Kapter Khana), 289, 290, 291
Shushal, 266, 267
Shushot, 252, 270, 271
Siachen glacier, 97, 330, 343, 388, 403, 406; length of, 5; height of, 99; expeditions to, 3, 294*n*, 336*n*, 345, 400, 405; tributaries of, 95, 275, 341, 399
Sikander, the Iconoclast, 14
Sikhs, 14, 15, 175; conquest of Baltistan, 45, 103, 164, 178–9, 214, 281
Sildat, 259
Simla, 12, 256
Sind, river and valley, 18, 19, 20, 76
Sinewaldi, 456
Singh, Sir Hari, 15
Singh, Sir Pratab, 15, 17
Sin Kiang (*see* Turkestan, Eastern), 463
Sir Daria, 496
Siva, 125
Skardu (Skardo, Skar-mDo, Skar-ma-mDo), plan of expedition to, 5, 18, 76, 502; basin of, 37, 99, 138, 275, 352, 506; glaciation of, 81, 83; rajahs of, 31, 60; arrival at, 36; winter quarters at, Chap. III; history, 43–5, 177; description, 45–8, 170; observations at, 80–3, 504–6; rock of, 46, 61, 80; fort of, 47–8, 92, 179, 250; animal life, 49, 432; officials, 49–51; celebration of *Muharram*, 53–6, of *Basant Panchmi*, 57; people of, *see* Baltis; carvings in, 96; spelling of name, 45*n*, 398; provisioning at, 70–3; departure from, 100, 103; routes and places round, 27, 91, 244, 259, 263
Simla, 12, 256

Skio, Zanskar, 273, 274
Sobu-la (Laswan), 276
Sod, 242, 244
Sodnam (king of Ladak), 179, 181
Soi river, conjectural identification of, 44
Sonamarg, 19, 76
So-ri, 292
Sorok Jilga, 437, 438
Spiti, 135, 165, 169; dances and plays, 174
Spituk (Pittuk), 146, 202, 222, 247, 250; monastery of, 162, 184, 185, 270; *kushok* of, 183, 188, 205*n*.
Srinagar, Kashmir, 12, 14, 19, 27; expedition at, 74, 75, 410*n*, 502, 503, 505; description of, 16; lake of, 13; pilgrims at, 312; in history, 22
Sron-tsan Gam-po (king of Tibet), 177
Stagtsang Raspa or Raschen (founder of Himis monastery), 117, 177, 207, 208, 214, 215
Stagtsang Raspa (*Kushok* of Himis monastery), 187, 188, 222, 271, 272, 280
Stakna monastery, 270
Stok, 175, 179, 180, 181, 182, 270
Strongdokmo, 66, 83, 99
Stupa, *see* Chaitiya
Sufi Kurgan, 499
Suget Dawan, 421, 423, 425
Suget Karaul, 304, 380, 381, 410, 420, 423, 502; height of, 304; fort of, 422, 424, 441
Sultan Said (Khan of Kashgar), 21, 44, 177, 311, 413, 492
Sung Yun (Buddhist pilgrim), 490.
Sunni, 56, 203, 430, 456
Surkowat, 443, 445, 446, 447
Suru river and Suru-Dras, 18, 27, 28, 34, 104, 228, 244, 245; people of, 76, 237, 241; confluence with other rivers, 103, 136, 146, 235, 239, 245
Syria, 490

Tagas, 97
Tagliks, *see* Pakpus
Tajik (people of Sarikol), 454
Takalung-la, 167, 168, 256, 259
Takla Makan, 463
Takta-korum, 415, 451, 453
Takt-i-Suliman, Kashmir, 16, 74
Takt-i-Suliman, Osh, 500
Taldat, 354, 358, 360–3
Tamerlane, 492
Tangskam (*for* Suru river, *q.v.*), 28
Tangyur, 131, 216
Tanka (religious painted standard), 125, 128, 140, 146, 181, 193, 205, 216
Tankse, 268, 269, 282, 350
Tantric doctrines and gods, 106, 108, 109, 110, 126, 214
Taotai (provincial governors in Sin Kiang), 464, 494, 495
Tara (two Lamaist goddesses), 177
Tarim, river basin and desert, 394, 432, 463, 489–96 *passim*
Tarim Sher, 341, 399–406 *passim*
Tarkutta, 31, 229, 506
Tartars, 430, 469, 490
Tashkent, 493, 494, 500, 501, 502, 504
Tashnatube, *see* Baksum Balak
Tato-la, 277
Taze, 239
Temesgan, 146–9, 157, 178, 247, 248–57 *passim*
Teram Kangri, 388
Terek Dawan, 496, 497, 498
Teshilhumpo (monastery at Shigatse), 112
Teshu Lama, 108
Testa Khan, 242
Tibet, Tibetan, in history, 44, 45, 177–9, 404, 490, 491; Ladak as a part of, 105, 164, 177; religious symbols from, 125; art, 131; books and printing, 131–3; family life in, 136, 428*n*; nomads of, 176, 284; disposal of dead, 197; animals of, 224, 225.
Tibetan plateaux, 353, 356, 362, 395, 417, 501, 502
Tien Shan range, 5, 425, 463, 478, 490, 496, 501
Tikse monastery, 183, 216, 270, 280; illustrations of, 107, 122, 130, 132, 208–11; monks from, 175, 191, 194; description and *kushok* of, 205
Timur-i-Leng, *see* Tamerlane; 492
Tinzap (for Yarkand river), 395
Tiznaf, valley and river, 421, 437, 438, 451–5 *passim*, 459, 470
Tokharistan, 490
Tol Depsa (Chung Jangal), 287, 288
Tolti, 31–4, 77, 78, 102; observations at, 253, 502, 504, 506

Torma (sympolical representation of evil), 191
Trans-Alai range, 497, 504
Trans-Himalaya, 275, 417
Trashi Teu, a chorten, 201, 202
Tsaka-la, 265, 266
Tsaparang, 163
Tsepagmed, 217
Tsepal Namgyal (king of Ladak), 178, 179, 180
Tso Moriri, 255, 260, 261
Tsong Khapa, 108, 111, 125, 177, 183
Tugluk Timur, 492
Tuman Aga (head of ten thousand), 454
Tungans, 493, 494
Tung-shan (Chinese official), 495
Turaghil, 437, 438
Turfan, 491
Turkestan Eastern, 463; religion, 56; previous excursions to, 164, 277–9, 405–7, 437, 475; rulers of, 165, 396; pilgrims from, 321, caravan route to India, 353; towns of, chief, 463, 485, 488, elders of, 442; British Consul-General in, 468, 475*n*; customs and organization of, 470*n*; cultivation of, 470; horses in, 472; history, 490–4; mines, 497*n*
Turkestan, Russian, expedition in, 5, 425, 501; bazaars in, 464; history, 490*n*, 491, 494
Turkestanis, Turkis, 430, 468, 474
Turkestan-la, 405, 406
Turki, 190, 391, 424, 437, 468, 472
Turkoman, 430
Turks, 469, 490
Tynzap valley (tributary of the Upper Yarkand), 437

Uighur, people and language, 469, 490, 491, 493
Upanishads, 114
Upshi, 167
Ural, 430
Urdek Saldi, 439, 440
Urdok glacier, 405
Urumchi, 463, 494

Vajra (thunderbolt of Brahma), 125
Vajrapani, 108
Ventura, General, 14
Volga, 430, 490

Wakkha river, 28, 136, 137, 228, 239, 244, 245
Wali Khan, 277, 493
Wazul Hadur (Wazul Hadan), 40–2, 167, 502–4
Wheel of Life, 150, 184, 186, 187
Wuri-la, 280

Yab Yum (Divinity embracing the Sakti), 126
Yaktil, 267, 268, 269
Yakub Beg, *see* Atalik Ghazi.
Yamen (Chinese official residences in Eastern Turkestan), 464, 474, 484, 486, 494
Yangi Dawan, 394, 434, 437, 438, 4[illegible]
Yangi Hissar, 482, 483, 484, 494
Yangi Shahr (Kashgar), 485, 494
Yangi Shahr (Yarkand), 472, 474, 475, 477, 485
Yangthang valley, 248
Yang Tig (Tibetan hymn book), 133
Yapchan, 315, 396, 397, 406
Yapchen, 483, 484
Yarkand, city and district, 5, 463, 502; products of, 46, 174, 361, 369; previous expeditions to, 165, 277*n*, 278; political refugees from, 292; pilgrims from, 311; British at, 471; expedition at, 471–81, 504; *amban* of, 472; Swedish mission at, 475; description of, 474–6; plan of, 477; longitude, 479; compared with Kashgar, 486–9; in history, 492–4; routes to, 97, 311, 321, 392, 406, 423, 425*n*, 470, 480, 485
— river and valley, 5, 414, 480; previous exploration of, 278, 373, 395, 396, 398, 432; source of (Rimu glacier, *q.v.*), 338, 343, 368, 403; exploration of, 371–94, 435–7; tributaries of, 372–92 *passim*, 403–4, 417, 451, 453; routes to, 420, 421; floods in, 448; people of, 454; lower course of, 463; ferry, 470–2
Yarma Nubra (Shayok), 285
Yasin, 396
Yaz (village in Eastern Turkestan), 470
Ying-drung, 140
Yogma Karbu, 236, 237, 244, 246
Yuechi, or Kushan, 490
Yul-ding-Thung (*see* Olting), 28
Yurgolok, 292, 293, 409
Yurta (tent of Russian Kirghiz), 428
Yuzbashi (head of a hundred) 454, 458, 460

Zanskar, district and river; 34, 158, 169, 179, 183, 224, 272–4, 297
Zarafshan, for Yarkand river, 470
Zingrul, 281, 282, 350
Zoji-la (Zoji Bal); 18, 20, 25, 76, 104, 169, 245; historical crossings, 21–2, 44
Zorowar Singh, army of, 28, 44, 48, 65, 103, 135; conquest of Baltistan, 15, 22, 45; conquest of Ladak, 178–9
Zufur Khan (ruler of Skardu), 43
Zug-Shaksgam valley, 405
Zunglas, 274

77° 30'

78°

36°

35° 30'

35°

DE FILIPPI EXPEDITION (1913-14)

DEPSANG PLAINS

AND

UPPER BASINS OF THE YARKAND AND SHAYOK RIVERS

Scale 1 : 250 000

0 1 2 4 6 8 10 Miles

Heights in feet

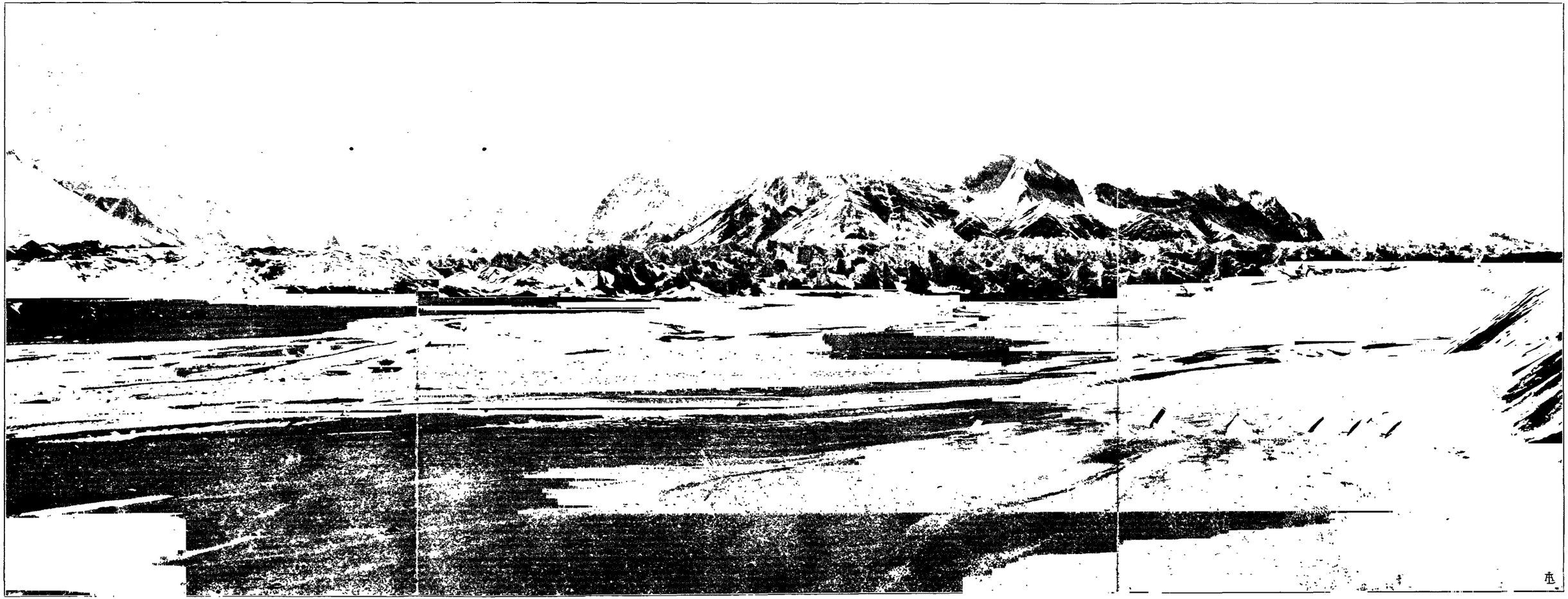
Rimu Gl. . . . . *Triangulation by A. Alessio and G. Abetti*
Plane-table survey by Jamna Pershad

Depsang and river-basins *Triangulation by H. Wood. and J. A. Spranger*
Plane-table survey by Shib Lal

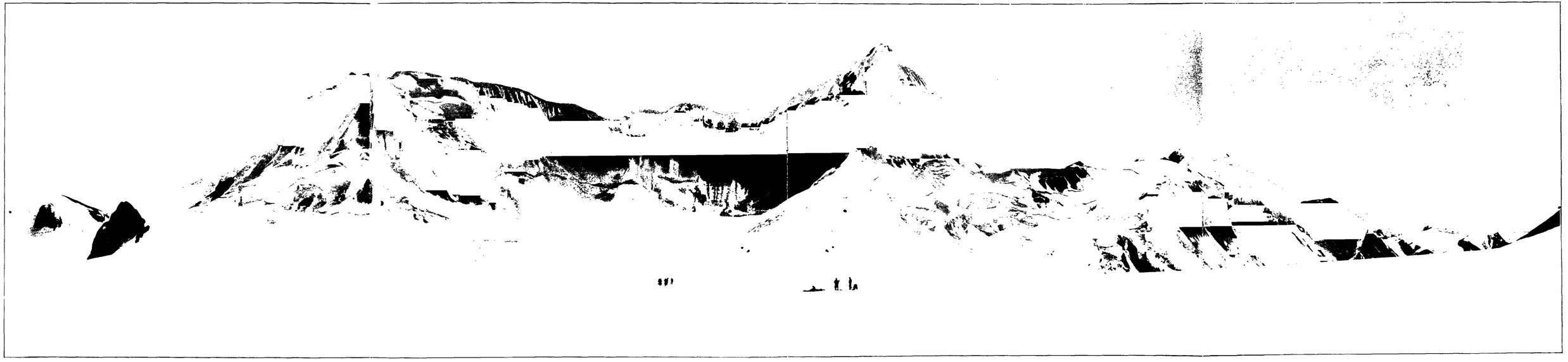
Camps and itineraires of the Expedition

Caravan routes

Yarkand R.
Kufelang
Yarkand R.
North Rimu Glacier
South Rimu Glacier
to Stakeyom V.
to Siachen Gl.
Shayok R.
Chang Khandun R.
Shayok R.
Tapa Yuk
Tapa Yuk
Chang Kung
Chang Kung
Raksum Bulak
Balti Brangsa
Kanikarum P.
Thang Laghia
Pullo
Daulat Beg-uldi
Darwaz Sarika
Ak-tagh
Chipchap R.
Basel Tam
Kyal Langar
Depsang Plains
Depsang Plains
Depsang Plains

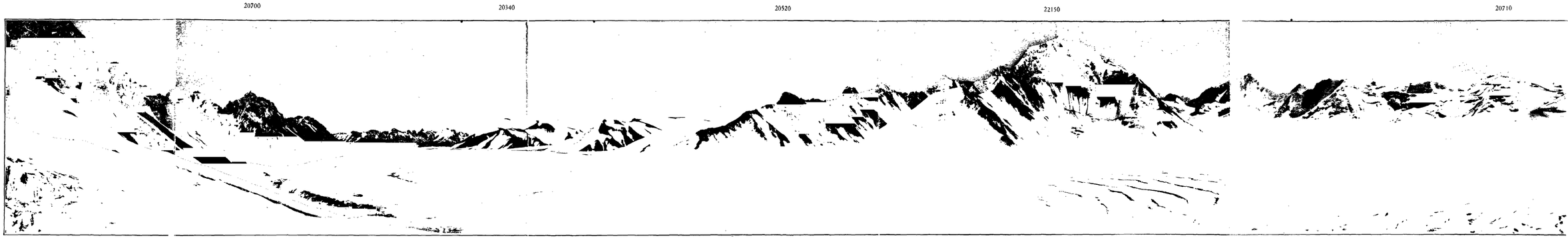


LEFT SIDE OF THE FRONT OF THE RIMU



COL AT THE HEAD OF NORTHERN RIMU

. . . . . *Saddle 19380 on the watershed* . . . . . .



Panorama C. - THE UPPER RIMU GLACIER. FROM A SPUR ON THE LEFT (NORTHERN) SIDE OF THE GLACIER (18960 ft.), A LITTLE BELOW THE UPPER BASIN

Confluence of the Northern with the Main Rimu Glacier

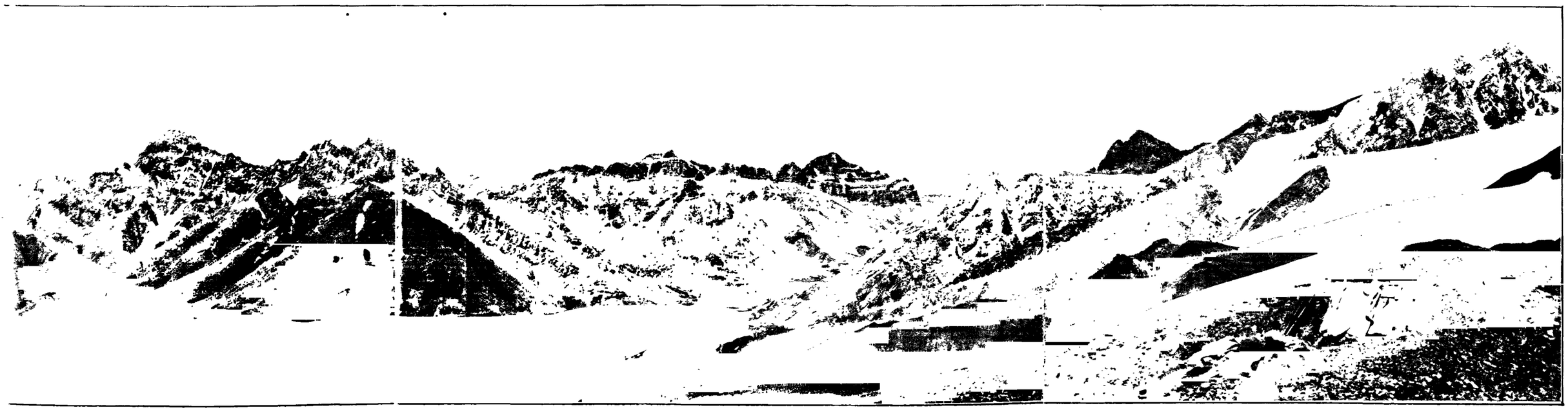
Northern Rimu

Panorama D. - FROM A STATION ABOVE THE ANGLE OF BIFURCATION OF NORTHERN RIMU

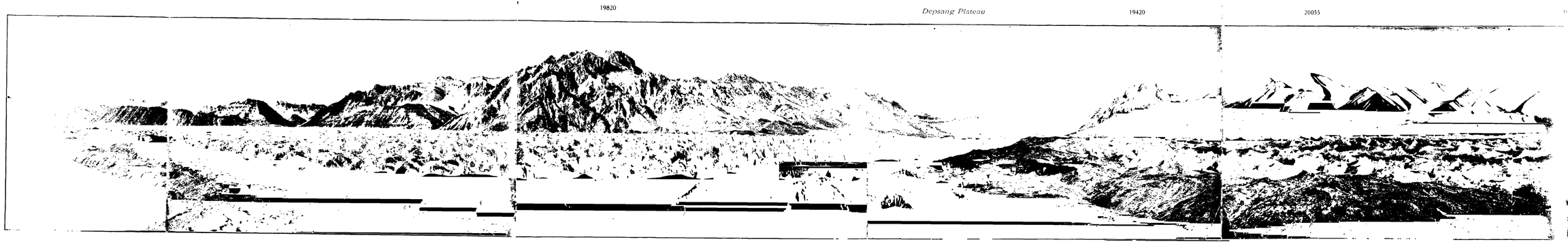
20710 21130 20980 *To the Siachen* 20930

E UPPER BASIN

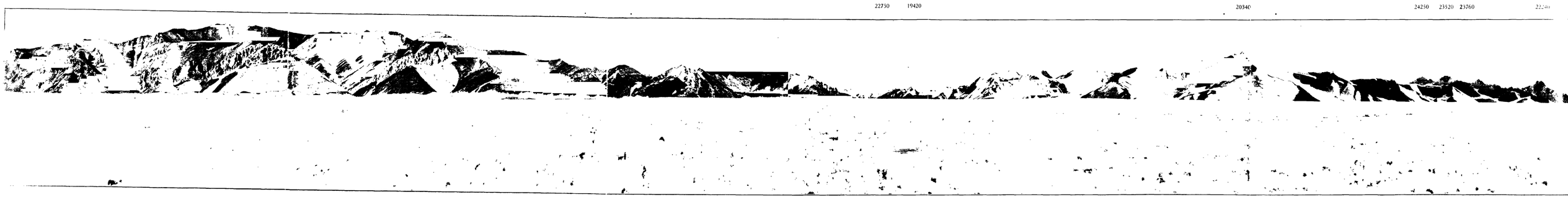
20690 20510



Origin of Yarkand River



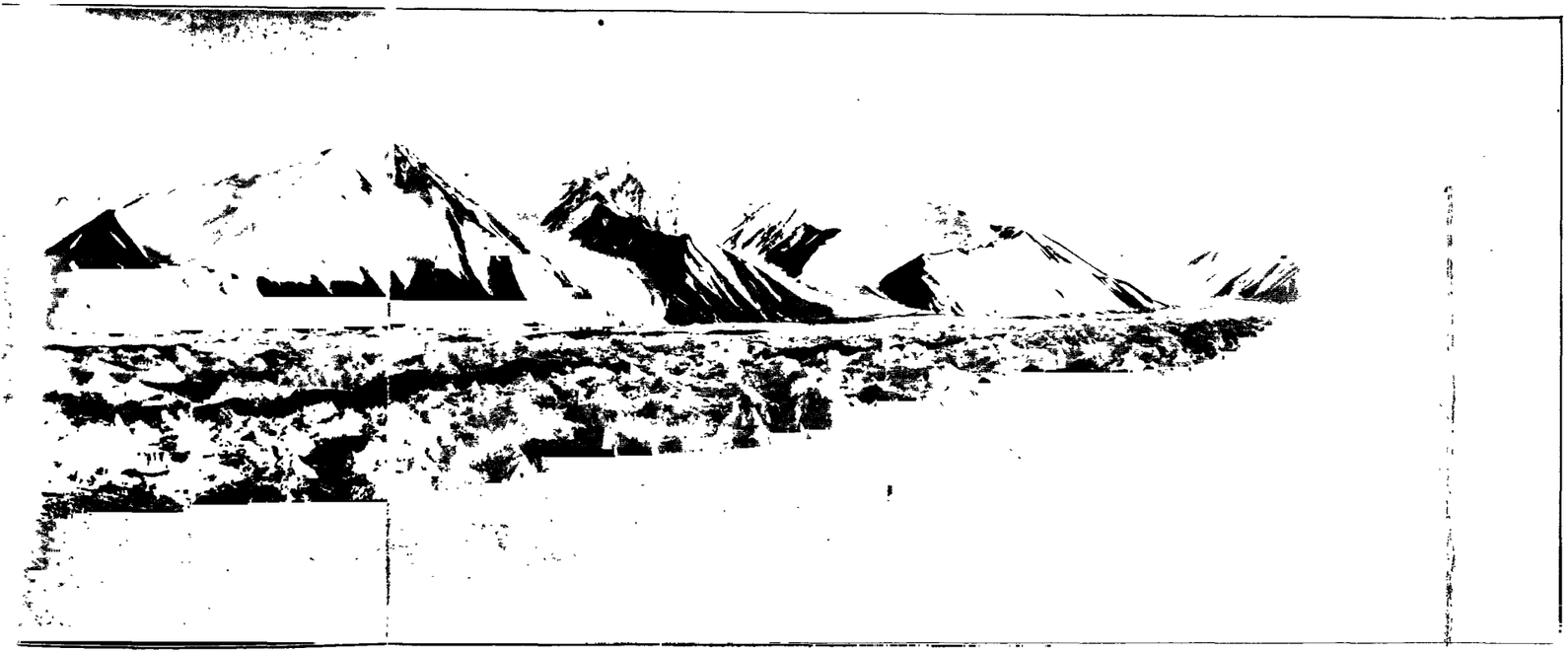
Panorama A. - FROM A STATION ON THE DIVIDING SPUR BETWEEN THE MAIN GLACIER AND SOUTHERN RIMU (16690 ft.) LOOKING EAST



Panorama B. (Circular) FROM THE CENTRE OF THE GREAT CURVE OF THE MAIN TRUNK OF RIMU GLACIER (17600 ft)

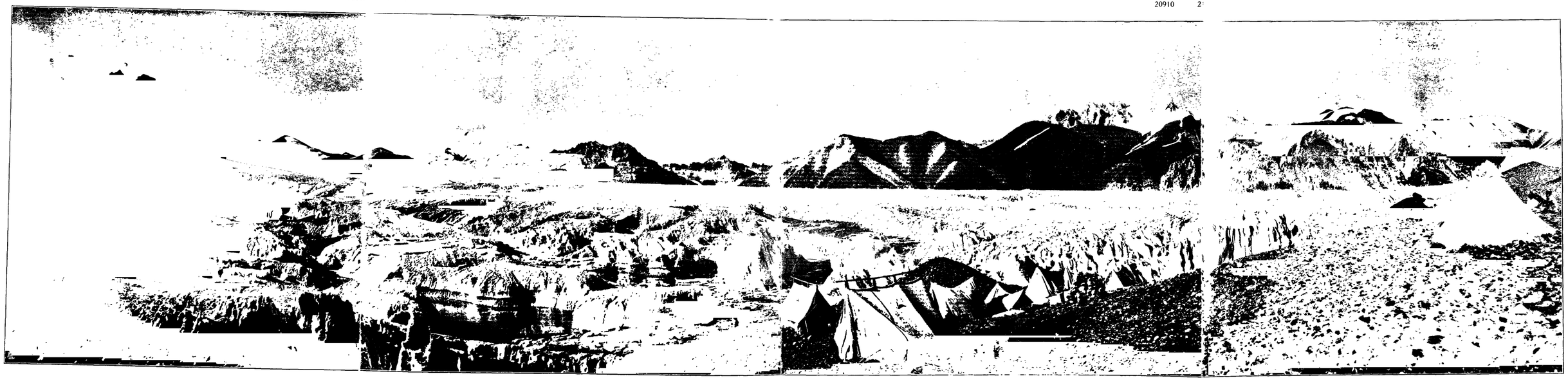
1952'

21390

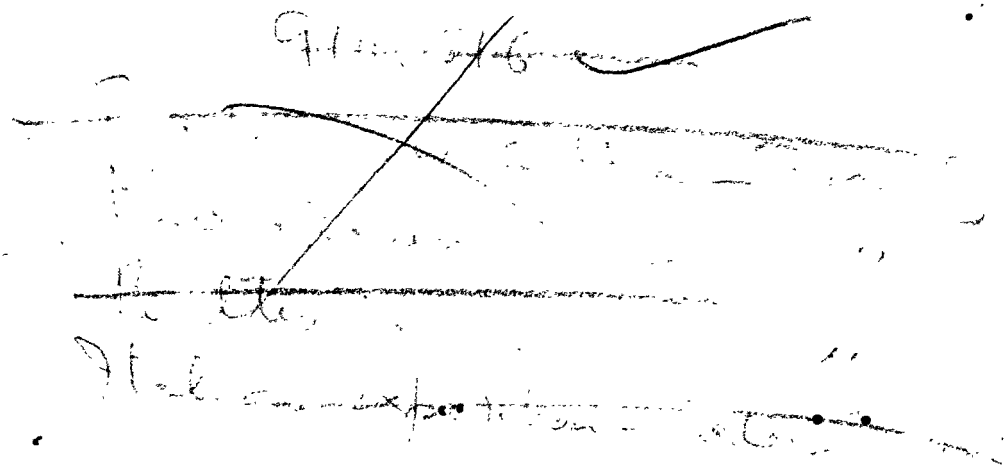


Southern Rimu

23760 22240 *Upper Glacier Basin* 19660 *Confluence of North Rimu* 21010



THIRD CAMP ON THE RIMU, AT THE JUNCTION OF THE NORTHERN BRANCH WITH THE MAIN BRANCH



D.G.A. 80.
CENTRAL ARCHAEOLOGICAL LIBRARY
NEW DELHI
Issue record.

Call No.— 910.4095/De F-33692

Author— De Filippi, Filippo.

Title— Italian expedition to the Himalaya, Karakoram & Eastern Turkestan.

Borrower's Name	Date of Issue	Date of Return

"A book that is shut is but a block"

CENTRAL ARCHAEOLOGICAL LIBRARY
GOVT. OF INDIA
Department of Archaeology
NEW DELHI.

Please help us to keep the book clean and moving.

S. B., 148. N. DELHI.

C

Travel >< Asia

British Minister, to counter-order these instructions and to command that the payments should be continued as heretofore.

But the advance was not thus easily repulsed. The same line of attack was adopted by more subtle methods when the routine accounts of the Customs Department were submitted to the Treasury. In these accounts was included the payment to the quarantine officers. The Ministry of Public Instruction was asked to verify this item and, not wishing to have the responsibility of approving an item of expenditure which the late government had directly forbidden, passed the papers on to the Sanitary Council. The President of the Sanitary Council was equally unwilling to bless the accounts lest the Sirdár Sipah for any reason go back on his word. He therefore passed them on to the Ministry of Foreign Affairs who were in his opinion the only body competent to deal with the quarantine officers who were foreign subjects. The Ministry also was not thus to be caught and, unable to think of anywhere else to send the accounts, returned them to the Sanitary Council with the minute that they had no information to give. The Sanitary Council in despair turned the matter over to the Commission d'Hygiène, whose members being young and enthusiastic asked the Ministry of Finance for an explanation and called for a detailed report on the sanitary conditions in the Gulf and the quarantine arrangements in the Gulf ports.

At this time quarantine stations were being maintained and staffed by British medical officers at Mohammerah, Bushire, Bandar Abbas, Lingah and Jask. The Government of India supplied the medical officers. It paid their salaries, which, with the exception of the salaries of the Residency Surgeon at Bushire and of his two assistants, were recovered from the Persian Government. This item together with the ordinary expenses involved in the working and upkeep of the services, cost the Persian Government an annual sum of about £4500. This sum was not sufficient to meet repairs, new buildings or renewal of apparatus. In 1907 the Imperial and Indian exchequers had

found it necessary to incur additional expenditure on various improvements, and again in this year the Chief Quarantine Medical Officer was compelled to ask for additional funds, pointing out to his Government that 'although the quarantine service operates primarily in the interests of Persia, it is also of real importance for the sanitary defence of adjacent countries, notably Iraq and India, and it is still of interest in checking the infiltration of plague, cholera, etc., from the East of Europe'.

There is no denying that the British authorities were bound to put their hands in their pockets and pay out something. The original plea of the Government of India had been one of danger from epidemics. To assure their own safety they had presented the Persian Government with a number of disinfecting apparatuses. That at Lingah had fallen into disrepair in 1914; those at Bandar Abbas and Jask during the following year. The Clayton Apparatus at Bushire was commandeered by the Mesopotamian Field Force in 1916, used, worn out and scrapped in 1918. The continuance of the Quarantine Service in British hands could only be justified if the disinfecting apparatus was maintained. The control of the Quarantine Service, as the Persians knew full well, offered the British a large measure of political and commercial prestige. If the service was to be found inefficient, the Persian Government would be well within their rights in taking it out of British hands and placing it under international control. To prevent any excuse for such action the Home and Indian Governments were prepared both to pay and to fight. A sum of £800 was sufficient for the moment, as the Sanitary Council on receipt of the report from the Chief Quarantine Medical Officer voted Ts. 2000 for unforeseen expenditure and Ts. 5000 for repairs and new work. The question of the repair of the Clayton Apparatus dragged on for several more months.

The year 1923 passed relatively quietly, but signs were not wanting that the Persian Government were mobilizing their forces for a yet more furious attack upon the Quarantine Service with a determined effort to replace the British by Persian doctors.

When the battle opened it was found that exactly the same methods were to be used as were successful in making untenable the position of the British doctors in the Imperial Hospital. The question of contracts was again raised. The British medical officers entered the Gulf at the request of the Persian Government. They were never offered contracts. When, then, the Ministry of Foreign Affairs asked the Legation for papers to show how British officers came to be employed in the Persian Gulf, they knew perfectly well what the answer would have to be. They then went a step further and announced that the question of payments to these unauthorized officers would be raised when the budget came to be voted upon by the *Majlis*. So important did the Government of India at that time think the retention of the British Quarantine Service that they were even willing to regularize the position and remove this opportunity of Persian attack by allowing their officers to sign contracts under the Persian Government. But the threatened attack in the *Majlis* was not made; the British service was not this year a subject of debate. The only change in the routine procedure was that Dr Millspaugh, the new American financial adviser, ordained that the salaries of the personnel of the service should be paid directly by the Treasury and not through the intermediary of the Customs Administration.

The Government of India was still fearful that an attempt would be made at the International Sanitary Conference in Paris in 1926, to show that they were not carrying out efficiently their obligations towards the shipping of all nations in the Gulf and that Persia, winning to its side nations unfriendly to Great Britain, would secure the transfer of the Quarantine Service to an international commission. They determined therefore, to strengthen their position by every possible means. They again raised the question of the desirability of establishing a sentinel sanitary station at Henjam. Any epidemic on the Arab side of the Gulf would cause a great flight of natives across to the Persian coast. In their opinion there should be a British quarantine officer at

every port. Above all Henjam and Charbar should be protected, where at present there was no resident medical officer. The proposal for the use of Henjam was, however, again dropped, as it was pointed out that if the suggested quarantine station was part of a scheme for the prevention of the spread of epidemics outside the Gulf, the already existing station at Bandar Abbas was equally convenient. If, on the other hand, the object of the new station at Henjam was only to prevent the spread of disease within the Gulf, then such a station was quite unnecessary, because the island of Henjam is very small and very few passengers tranship there.

During all these troubled years the Sanitary Council had continued its chequered career. Dr Gachet, the President, was recalled to France in the opening months of the war and his place was taken by Dr Amir Aalam, a competent, single-minded physician, who had received a French training, spoke English and French moderately well, and was a relation by marriage with Vossugh-ul-Doula. During the troubled days of the war the Council did very little except meet with laudable regularity. Unfortunately, all the money which had been collected from the pilgrim and horse taxes disappeared and again it became an impotent, though principal, sanitary authority in the country.

After the *coup d'état* of Riẓá Khán the Council was absorbed into the Ministry of Health in the Cabinet of Sayyid Ẓiyá'-ul-Dín. Dr Moadebod Dowleh, son of the famous Dr Náẓim-ul-Aṭibbá, was nominated as first Minister of Health and *ex-officio* became President of the Council. The Sayyid's Cabinet lasted only a few months. When it fell, Moadebod Dowleh retired into private practice again and Ḥakím-ul-Doula took his place. Again the Cabinet thought fit to change the Sanitary Council. A new set of rules governing both the constitution and the procedure were drawn up. Instead of being attached to the Ministry of the Interior as before, its transference to the Ministry of Health (Ministère de l'Hygiène et de l'Assistance publique) was confirmed. Its title received a corresponding change. It now

became known as the Supreme Council of the Ministry of Health (Conseil Supérieur du Ministère de l'Hygiène). Its composition remained unchanged: the representatives of the foreign legations retained their seats. Its duties, chiefly advisory before, now became completely so. No budget was allotted. Amir Aalam resumed the office of President.

Very soon, however, it became clear that the Council, probably because of the large foreign representation upon it, was regarded by certain members of the Government with no favourable eye. Its ancient model, the Constantinople Board of Health, had already disappeared. It seemed to be the policy of the Government to let the Persian Council follow suit. This could easily be brought about by the simple expedient of paying no attention to its recommendations, a method used with success before. At the April meeting of 1923 the President informed the members that the Minister of Public Instruction, to whom he was responsible, had informed him that in future all communications were to be transmitted through that ministry and not sent direct either to other ministries or to the foreign legations. This was an order in direct defiance of the *Règlement Intérieur*, approved of by the Government. Dr Amir Aalam was not slow in pointing out that their constitution of two years previous gave the Council the right of direct access, that such access assisted rapidity of action; and that the peculiar composition of the Council was greatly appreciated by the Persians in general and gave it great authority. In these circumstances he proposed to disregard the ministry's instructions until the cabinet as a whole took the same line. In this he was supported by the vote of the whole Council excepting the representative of the Ministry of Public Instruction.

A less direct attack was then made by the formation of a health section within the Ministry of Public Instruction. Through this health section the Minister could at any time take action without consulting the Council. This called forth a protest from Dr Mesnard, the Director of the Pasteur Institute, who was now the Vice-President of the Council.

It was clear that the Council was on its death-bed. To stave off dissolution Dr Amir Aalam appealed to the Sirdár Sipah. He first attempted to get the Council transferred from the aegis of the hostile Ministry of Public Instruction back to the Ministry of the Interior. In this he was unsuccessful. But he succeeded in persuading the Sirdár to abolish the health section of the Ministry of Public Instruction and to form a new department of State, which he called the Public Health Department. This was practically independent and had the authority of the Sanitary Council behind it. Dr Amir Aalam was appointed the first Director of this new department and Dr Khalil Shafaghi Alam-ul-Doula took his post of President of the Sanitary Council.

In his final address to the Council Dr Amir Aalam made a bold and frank exposure of the fearful state of the public health of the country. Personal rivalries, political disturbances and national bankruptcy had completely destroyed the organization which Dr Tholozan and Dr Schneider had spent so much time in building up. His position gave him such a unique knowledge and his nationality so surely removes all fears of exaggeration that I am inclined to quote this speech in full. He said:

> Before leaving you I would like to give you some detailed information on the general condition of the Public Health Services.
>
> For the last two years the general sanitary situation of the country has left much to be desired. Provincial Medical Officers of Health, having failed to receive for several months their salaries, have for the most part abandoned their posts. That is especially true of Khorasan. An indifference, a *laissez aller* truly regrettable reigns with regard to all questions of public health. Our plans, our schemes, our cries have had no chance of finding an echo in governmental or parliamentary circles. The Minister of Public Instruction in spite of his formal promises has done almost nothing for us during the two long years which have just passed. Forgetful of the written assurances which he gave to us, that Minister in one of his latest replies admits that he has been unable to fulfil his pledges and seems to me to insinuate that if nothing has been done, it is my fault, because during the two and a half months when I occupied the post of Minister of Public Instruction, no plans were put

forward. It was, I regret to say, H. E. Ḥakím-ul-Doula who signed that letter.

To avoid all misunderstanding you will kindly allow me to quote the history of the three months when I was Minister in order to show you that your President has always done his duty.

The Cabinet, which two years ago entrusted to me the portfolio of Minister of Public Instruction, to which was attached that of Public Health, from the very beginning found itself in a financial crisis of the most severe and unfortunate kind the details of which you will allow me to pass over. The affairs of the Sanitary Council were no more satisfactory than those of the Ministry of Public Instruction. The provincial Medical Officers of Health had received no salary for seven, eight or even nine months. The personnel of the sanitary stations at Astara and Enzeli had not only not been paid for more than a year, but their salaries had been suppressed in the budget on the grounds that the Caspian Ports were in revolt. The sanitary personnel, who, contrary to the action of the functionaries of other administrations, had not deserted their posts, were punished instead of being rewarded. No warning had been given to them that they would not be paid.

It is not the Ministries of Public Instruction and Public Health alone which suffered. All ministries, all government departments found themselves in a similar state. In addition to these difficulties and an equally disquietening poverty the Government found itself faced with troubles and almost universal uprisings, the most serious being those in Khorasan, Gilan, Azerbaijan, Luristan and Kurdistan. During the three months of the life of our Cabinet the Ministers were occupied almost continuously with questions of prime importance and urgency. Expeditions had to be sent out on every side and means found to cover their expenses. The solution of troubles and the putting down of insurrections necessarily absorbed all our time and all the activities and efforts of the Government. Thanks to our young and valiant army with a commander of such courage at its head as H. H. the Sirdár Sipah, our renowned Minister of War, we were sure of success in the end. But still, money had to be found. Everything had to be sacrificed for the Army.

This does honour to our country, for it is a story of success after success in spite of all, of quietening of troubles and of suppressing of insurrections. In spite of its watch over this general grave situation, the Government did not fail to occupy itself with financial reforms. To be

able to give the necessary development to public health I proposed a budget of Ts. 2,000,000. This sum well employed would have assured to us the means of ameliorating our public education and sanitary condition and was not disproportionate to our finances and the other expenses of the Treasury General.

I think that Persia could and ought to make great sacrifices in order to teach her people and assure her health. Money spent on education and physical health is money set out at interest, not money spent. Education and public health are the fundamental source of the riches and greatness of a country. This has been and always will be my principle.

In brief, on the days when I was due to explain to the Chamber the budget which I had drawn up, unfortunate quarrels arose among the deputies. The Budget Commission opposed my plans. And some days later the Cabinet fell and the financial crisis was over.

Although obliged to put a limit to our ambitions in sanitary matters, we are now forced to claim our arrears. We prepared and presented to the Minister of Public Instruction a restrained budget and in return we were promised marvels. But two long years have slowly passed during which we have been put off by promises and official assurances. When all the departmental budgets have been passed by Parliament, ours, which we had presented the first, has not even reached the committee stage owing to the dictates of the deputies or it has been forgotten by the committee at the command of the Minister of Public Instruction. In the closing days of the fourth session of the *Majlis* we see that we have been passed over. In all haste H. E. Ḥakím-ul-Doula has taken immense trouble to get approved a budget of cooked figures.

In 1925 Major Nicholson succeeded to the post of Chief Quarantine Medical Officer. In his initial report he did not attempt to conceal either from the British or from the Persian authorities the defects of the service. He found that payment by the Persian Government was in arrears. A sum of Rs. 25,700 for salaries and pensions for the twelve months July 1923 to June 1924 was still unpaid by the Persian Government. The Persian personnel who should have received their pay direct from the Persian Treasury, not through the Government of India, were threatening to strike. Against a routine annual expenditure of

about Ts. 218,000 only Ts. 184,000 were allotted. In all these matters Major Nicholson found himself tied and helpless. He had no hand in the preparation of the budget, which was left to whatever official in Teheran happened to be in charge of the medical and sanitary affairs of the country. He reported to the Sanitary Council that there were no funds available for the hire of boats, for routine telegrams, and for emergencies. To the Legation in Teheran he reported that there was urgent need for new buildings and repairs to old ones, extra hospitals, extra equipment such as transport and jetties, and finally he begged the Minister to urge upon the Persian Government the need for payment of their past dues.

These reports received a very sympathetic hearing from Dr Amir Aalam, who was then still head of the newly founded Health Department. Again he drew up an ambitious programme. He proposed to construct quarantine stations at Pahlevi and Astara, Qasr-i-Shirin, Julfa, Lutfabad and Bandar-i-Gaz. The sanitary condition of Teheran was to be improved by the construction of a tuberculosis sanatorium and by improvements in the Women's Hospital. And, finally, Ts. 20,000 were to be allotted to repairs in the quarantine buildings in the Persian Gulf and Ts. 8000 were to be spent on the purchase of a new Clayton Apparatus. His programme was rejected *in toto* by the finance department.

In April 1926 Dr Neligan left the Legation after twenty years of service, devoted whole-heartedly to the welfare of Persia, and it fell to my lot to fight the battle of the Quarantine Service in the capital. In his final speech to the Sanitary Council, when bidding them farewell, he spoke very freely of the defects of the Persian public medical services. Dr Neligan never held a very high opinion of their methods or their men. His speech was listened to with a mixture of respect and relief. The loss to Persia which his departure meant was so completely overshadowed by the rejoicings of the coronation of Riẓá Khán, who in the same month was crowned Shah of Persia under the title of Riẓá Sháh

Pahlaví. With the exception of a few personal friends scarcely a Persian noticed the departure of a man who had been an outstanding figure in the Persian medical world from the first days of the Revolution until the accession of the Pahlaví dynasty. A small reception in the School of Medicine was hardly the reward which might be expected by a man who had been President of the Sanitary Council, founder of the Vaccination Service, personal physician to all the leading families of the realm, and a willing adviser at all times on all matters connected with medical education.

In May the International Sanitary Conference opened in Paris. It seemed to be passing off as smoothly as such conferences usually do. The Persian delegate appeared to be ignorant of the defects in the Gulf Quarantine Service; at least, he showed no signs of attacking the British Government for any failures in this respect. Quite suddenly, on 16 June a few days before the new Convention was to be signed, he refused to re-indorse Article 83 of the 1912 Convention, which had been incorporated in the new Convention and up to that moment had been passed without debate. He claimed that 'it consecrated a system which was humiliating for Persia and unjustifiable on technical grounds' and that the Persians were now quite capable of managing their own affairs. The article in question ran as follows:

> Le régime sanitaire du Titre 1er de la présente Convention sera appliqué, en ce qui concerne la navigation dans le Golfe Persique, par les authorités sanitaires des ports tant au départ qu'à l'arrivée.

In vain the President of the Conference pointed out that the issue so raised was a political and not a sanitary question. The Persian stood to his guns; he was determined to make a gesture for Persian independence before the whole world. The scene in the Council Chamber was the most dramatic of the session. A vote on the retention of the article in its old form was made by a show of hands. There were many abstentions and the total count showed an equal vote.

The British delegate then spoke at great length on the question. He pointed out the danger to shipping, to India and to Europe, that it had certainly grown no less since the Quarantine Service was established, but rather the reverse. The advent of aeroplanes, the establishment of a trans-desert motor service and the opening of the Basra-Baghdad-Aleppo railway had brought the Levant and Eastern Europe to within the incubation period for plague and cholera, if a passenger was infected in the Gulf. Persian medical training had not yet reached the stage necessary for entrusting such responsibility to the Persians. But the delegate would not compromise. It was then put to a secret vote. This time the Persian objection was overruled. Unwillingly he signed the Convention, but added a reservation, to which the British, when they in turn signed, added the following reply:

La délégation britannique tient à faire constater que la réserve persane ne peut en aucun façon modifier le *statu quo* actuel en attendant un accord à intervenir entre les gouvernements persan et britannique.

It was now perfectly clear that it was only a matter of time before the Persian Government assumed the complete control of the Quarantine Service in the Gulf. In fact, in January 1927 the Ministry of Foreign Affairs without any concealment or veiling of their aim asked the Legation when the Quarantine Service was to be transferred to them.

Such was the state of affairs when Sir Robert Clive arrived in Teheran as British Minister. He was apparently instructed to set the whole service upon a permanent and legal footing. The position of the British officers had to be regularized according to the latest laws of the *Majlis*. He tried to make certain that the Persian Government would meet with regularity the financial needs of the service and that at no time should they be able to exercise pressure upon the Government of India by a threat to withhold salaries and pensions. And, finally, he had to make sure that the Persian Government accepted the service as a whole and would leave the individual appointments to the discretion of the Government of India. The foundations upon which he could

build were the articles of the International Convention of 1912. The Convention of 1926, although reaffirmed with a reservation by both English and Persian delegates, was not ratified by the *Majlis* and left the Quarantine Service in *statu quo*. It was only upon the earlier Convention that diplomatic conversations could be based.

But the Persians would have none of this. On their side were two strong men—Taimur Tash, Minister of Court, and Bahrami, Head of the Health Department. The former, who had been a simple provincial deputy, had risen by skill and hard work to be the shah's right-hand man. The shah himself dealt with the army, Taimur Tash with everything else. Bahrami, although his critics were not slow to speak scathingly of his medical knowledge, was a man of fixed purpose. Neither he nor Taimur Tash were violently anti-English. Both meant to secure the immediate cession of the Quarantine Service to the Persians and steadily they pursued their course. Step after step was taken slowly and deliberately. Expostulations were in vain: Bahrami never withdrew.

In the spring of 1927 Dr Bahrami visited the Persian Gulf ports in person. On his return to Teheran he sought an interview with Mr Havard, then Oriental Secretary to the Legation, and explained to him what his scheme for a newly constituted quarantine service was. He had no desire to replace the British officers by doctors of his own nation, although he was careful to point out that he had already deprived all the Russian doctors in the Caspian ports of any power of interference in quarantine work. All he desired, he said, was that the service should remain as it was, but that the Persian Health Department should supervise and direct it. As the Quarantine Service had always worked under the direction of the Sanitary Council to whom the Chief Quarantine Medical Officer had held himself responsible, this did not seem a very important modification. It was accepted without demur.

On 28 May, a few days after Dr Bahrami's return, I received an invitation to a party at the house of Dr Hakim Aazam, the

doctor who had represented Persia at the Sanitary Conference in Paris in the previous year and had created the storm in the teacup. There I found that Jawad Khan Sineke of the Foreign Office and I were the only guests. In the conversation that followed Hakim Aazam advanced the Persian demands a stage further than Dr Bahrami had told Mr Havard. Hakim Aazam declared himself perfectly satisfied with the present arrangements in the Gulf and maintained that all that he desired was that the position should be regularized. He suggested as a modification that the whole staff should be Persian and that the British medical officers should be appointed in the same way that the American financial advisers were, that is to say, supernumerary to the regular staff but with executive powers. Finally he said that the pay of the British medical officers was included in the budget of this year, but would not be included next year unless some satisfactory arrangement was made in the meantime.

This conversation I reported to the Minister who thought the demands reasonable.

Dr Bahrami then took a most audacious and far-reaching step; he appointed a Persian doctor as Chief Quarantine Officer in the place of Major Macgregor. The letter of appointment is on record:

To Dr Sayyid Abdul Ali Khan Tayyibi, Director of the Southern Health Department, Shiraz.

Farvardin 17th 1306.

On the authority of this letter you should bring all the quarantine stations of the Gulf Ports under your supervision, making inquiry into their precedence and giving necessary instructions regarding their personnel, budget, financial and professional affairs. Submit necessary reports to the Capital.

The newly appointed Chief Quarantine Officer thereupon wrote to Major Macgregor as follows:

Farvardin 23rd 1306.

In forwarding a copy of an order issued by the Director of General Health Department, I beg to state that it is necessary that you should in future submit your reports to the Southern Health Department direct concerning your actions connected with quarantine matters in the

southern ports. You should ask from this Department for instruction in all professional matters as well as in questions of personnel, budget, appointments and dismissals of members and employees, and of finance. As was told to you verbally, you should send to the Southern Health Department as early as possible two copies of last year's budget and the budget prepared by you and Major Hall for this year. Also please send a nominal roll of Medical Officers and Staff together with a list of furniture and other articles of the Quarantine Service of the Southern Ports.

Major Macgregor briefly replied that he took his orders from Teheran and refused to obey. At once Dr Bahrami was informed by Mr Havard that he had acted *ultra vires* and that the whole subject was not to be thus prejudiced but would be settled by normal diplomatic action in due course.

A serious outbreak of cholera in the Persian Gulf in July put a stop for the moment to further quarrelling. Dr Tayyibi was only too glad to leave Major Macgregor in undisputed charge. The action of the Sanitary Council was prompt, even if somewhat melodramatic. An Anti-Cholera Commission was formed in Teheran with Dr Bahrami as chairman: vaccine was bought in Berlin and sent south by aeroplane: the Iraqo-Persian frontier was closed and all movement between Shiraz and the south was forbidden.

In view of the Persian claim to manage their own quarantine affairs it is well to enlarge a little on these last two measures. Basra had a single case of cholera on 26 July. Quarantine was promptly established at Qasr-i-Shirin, a frontier village on the Baghdad-Kermanshah road, although there was still no cholera within 500 miles of this frontier. At the same time passports were refused to any Persian wishing to travel to Iraq. One is almost forced to hold that these measures were actuated not by medical prudence at all, but by a desire to cause trouble to Iraqis coming to Persia and to hold up the pilgrim traffic which carried much Persian wealth into Iraq. For at that time political relations between Iraq and Persia were not at all friendly.

The quarantine camp at Qasr-i-Shirin was so disgracefully mismanaged that the British Minister was forced to protest and a commission of Persian doctors went down to examine the state of affairs. Their report was never made public. At the same time it was reported that inoculation certificates were unheeded and that immune travellers were compelled to undergo the full quarantine. The official legation mail also was detained. The report of an actual *détenu* is not pleasant reading:

> The camp is situated below the town on the edge of the river. A large double-fly tent is provided for First Class travellers. Iron bedsteads and bedding are provided, but the sheets and pillow cases are very dirty. One long table, covered with oil cloth, and a few rickety chairs are also provided. Food is obtainable from the cook attached to the Quarantine Station. It is filthy and expensive. During the daytime the tent is full of flies; the food and table are covered with them. There is a filter provided for drinking water, which is not boiled. This is brought direct from the river which has previously passed the town. Sanitary conditions are appalling. There is a deep water-course passing the camp. Over this two boards with a space in-between have been placed across the ditch. This platform is enclosed with reeds. While I was in quarantine, this water-course was being cleaned and the stench was appalling.
>
> It would be hard to conceive any better breeding ground for germs of every sort than in the quarantine station. No medical attention is given that I saw. Should a case of cholera ever develop there, it would spread like wild-fire throughout the camp.
>
> A separate single-fly tent is provided for European ladies, but it is quite uninhabitable during the day.

The official reply to the protest came from the Health Department, who countered the British charge of Persian inefficiency by stating that cholera had only appeared in Persian ports owing to the incompetency of the British quarantine officers at Basra and Mohammerah; that the closing of the frontier was entirely the fault of the Iraq Government who kept the Persian Government uninformed of any precautionary measures that were being taken; and that the frontier medical authorities had no confidence in

some of the certificates of injection produced by travellers and that they were therefore compelled to reject them all.

These quarantine arrangements were not only inefficient, but also were hopelessly inadequate. To guard hundreds of miles of desert frontier is a gigantic task. Chauffeurs, camel-drivers and others who knew the by-paths or the guards passed backwards and forwards without molestation.

Conditions in the quarantine station at Shiraz were very little better. An English doctor, who was interned there, thus described it:

> The only drinking water available was from a water-channel. No steps were taken to protect it or to render the water for drinking sterile....No latrine accommodation or urinals of any kind existed... nor were there any soakage pits to dispose of the fluid refuse from the place....The Medical Officer in charge...had no cholera apparatus and no drugs...save calomel and quinine.

It was not until 20 November that the country was declared free of cholera. Officially the number of cases which occurred was 829 with 700 deaths; but this must certainly be an under-statement.

I have already said that there was a third party interested in this dispute. This was the Company formerly known as the Anglo-Persian Oil Company. This Company has been established in South Persia since the beginning of the century. The Company have constructed their own port of Abadan, which is the termination of the pipe line. The health of the whole territory involved in the concession, including the port of Abadan, is supervised by their own medical officers. Just above Abadan lies the Persian port of Mohammerah and only a few hours above Mohammerah lies the Iraqi port of Basra. Thus within a few miles are three ports under three different controls. After the defeat of the Turks until the present dispute arose, all these ports were under British management, which assured a certain amount of unanimity of plan and action. Should the port officer at Mohammerah be replaced by a Persian, there would be grave risk of friction with his Iraqi colleague above stream and his British colleague below.

Clive now reopened negotiations in the face of Bahrami's high-handed action in the appointment of Dr Tayyibi. He suggested that the Chief Quarantine Officer should be a Persian with British medical officers serving under him, that the service should be a Persian Government service, responsible to and controlled by the Health Department of Teheran, and that the British medical officers should have contracts granted to them by the *Majlis* not terminable before five full years had passed. In this way he hoped to ensure that the passage of executive control into Persian hands should be gradual and not abrupt. At the same time all arrears of pay owing to the Government of India by the Persian Government were to be paid in full.

Whilst these notes were passing between the Legation and the Ministry of Foreign Affairs, Bahrami had not let the grass grow under his feet. In January of 1928 he informed the Minister that the Budget Commission had definitely refused to contribute another halfpenny towards the pay of the British medical officers and that they were to be dismissed on 20 March, that is, the last day of the Persian year. To protests at this abrupt dismissal while the matter was still under negotiation, Taimur Tash sent a written reply. He regretted the whole affair, but explained that it was part of the policy of his government to 'engage in their service no citizen of a limitrophe country and that moreover no foreigner could be engaged in any capacity without his contract first being approved by the *Majlis*'. He himself was powerless to help the English doctors, because their salaries had been omitted from the new budget and there could be no question of contracts being granted to them by the *Majlis*. He assured the Minister that Bahrami could lay hands upon a sufficiency of trained and competent doctors and that in order to make doubly sure the *Majlis* had just passed an Act authorizing the employment of a French or German doctor as technical councillor to the Health Department. There was therefore not a vestige of reason for the retention of the British doctors in the Persian ports.

The British Government could now do nothing except point out the selfish attitude that the Persian Government had adopted, their ingratitude to a body of men who had served Persian interests for nearly half a century, and attempt to save British prestige by receiving some public acknowledgement of these services. This last Taimur Tash agreed to do. Accordingly, on 21 May the official thanks of the Persian Government were thus conveyed to the British Government over the signature of the Minister of Foreign Affairs.

Ordibihasht 1307.

My dear Minister,

At a time when Persian doctors are engaged in taking over the quarantine service in the southern ports I am glad to express in the name of my Government the appreciation of the philanthropic and humane services rendered there in the past by English doctors. I beg you to convey to these doctors the thanks of the Persian Government.

Yours etc.,

Fatoullah Khan Pakrevan.

The whole incident seems strangely similar *mutatis mutandis* to the abrupt dismissal of the British doctors from the Imperial Hospital five years previously.

The transfer being thus accomplished the Persian Government expected the British quarantine officers to give up their posts in March. No foreign technical adviser was even approached until May. It is not untrue to say that the Government of India was seriously alarmed at the possibility of a fresh outbreak of cholera during that summer. They even offered to finance the whole quarantine service for another six months in order that the transfer might be more gradual and Persian control commence during a less dangerous season. At the same time they offered to train a Persian doctor in the duties of Port officer in one of their own ports.

The Persian reply was the appointment of doctors to Bushire, Mohammerah, Bundar Abbas, Jask and Lingah. On 17 July they arrived in Bushire. In the meantime the acting quarantine officers had received no instructions from the Government of

India to hand over their duties and at first they declined to do so. Within a week they received orders by telegram to comply with the Persian demands. The Chief Quarantine Medical Officer handed over the keys of office on 28 July and the more distant ports surrendered one by one as their Persian successors arrived. On 4 August British control came to an end.

The new Chief Quarantine Medical Officer was a nephew of the Head of the Health Department and was also of the name of Bahrami. Scarcely had he taken over his new and difficult post when his chief resigned and was succeeded by Dr Sayyid Malek Loqmán-ul-Mulk, a surgeon rather than an administrator, but a man trained in Western methods. About the same time Sir Lionel Haworth was succeeded by Sir Frederick Johnston as Consul-General in Bushire. The younger Bahrami was keen and energetic. Had he had any special training in Port Administration he would have made a good quarantine officer. He owed his knowledge of bacteriology largely to Dr Mesnard of the Pasteur Institute, Teheran, where he had served a long apprenticeship. He was a friend of Dr Neligan, spoke French well, and understood a little English. But his job was bound to bring him into conflict with the English in the south. No sooner had he entered into office than he was ordered to demand the further surrender of the Charitable Hospital at Bushire which had remained in British hands.

Until 1916 the poor of Bushire were treated gratuitously in the Charitable Dispensary attached to the Residency. In that year the suggestion was made that a voluntary hospital should also be founded and for this object both English and Persians subscribed. The merchants of the place voluntarily agreed to the imposition of a small tax upon all packages passing through the port. The new hospital was placed under the direction of the Surgeon to the Residency. Because he was also Chief Quarantine Officer he often found it more convenient to remove sick cases from ships in the harbour to this hospital rather than to the quarantine hospital which lay on an island out in the bay. It is quite clear that the

hospital was a benevolent, voluntary institution, essentially Anglo-Persian in character, built by British and Persian charity and maintained mainly by joint British and Persian money. It was intended from the beginning—by the Persian as well as the British founders (neither party of whom would otherwise have felt safe in contributing)—to be used by the Residency Surgeon in conjunction with the Residency Dispensary. The management of it was legally confided by the founders to a committee of two Persian and two British members. It is clear that it was not a Persian official or government hospital, because the Persian Government contributed nothing towards construction or annual upkeep. It had nothing to do with the Quarantine Service. On the contrary, it had an official British connection, because the British Government had a partial proprietary right in the hospital as it stood, which the Persian Government had not. And it was the British Government that worked up the scheme, superintended the building, provided the medical apparatus, and paid the salaries of the superior staff.

In spite of their inability to support their claim in January of the following year the Persian Government were informed that the hospital would be handed over to them. A new, though smaller hospital, was constructed within the Residency walls, all the equipment was transferred from the old building to the new, the Consul-General and Colonel Dickson resigned from the Committee of Management and Dr Bahrami Junior proudly took possession of his empty shell. Once again Persia had succeeded and Nationalism triumphed over the foreigner.

With the exception of the trouble over the Charitable Hospital, some minor disputes concerned with the landing of shore-leave men off H.M.S. *Lupin* and H.M.S. *Triad*, and a small difficulty in arranging the status of Dr Lincoln of Mohammerah who was both Quarantine Officer and British Vice-consul in that port, the first year of Persian control of the ports passed without friction. Neither cholera nor plague appeared which might worry the peace of mind of the new Chief Medical Officer. In the spring

of 1930 I had the good fortune to be able to visit Bushire and see for myself how the new system was working. I found that Dr Bahrami Junior had established his office in Bushire and was assisted by Dr Amidi, who had been trained in Beirut and Cairo. He was an excellent and willing worker, even though his salary was somewhat in arrears. The Persian Government was still unable to meet the calls of Public Health upon its purse. The subordinate personnel had not received their salaries for four months. The Charitable Hospital was closed owing to the inability of Dr Bahrami to pay the drug bill. The emergency quarantine hospital in the bay was closed for similar reasons.

Numerous petty complaints were, of course, to be heard. As might be expected, the new doctors observed the letter of the law rather than the spirit. They were taking no risks. Occasionally, political jealousies were at the bottom of the trouble. Thus, the Oil Company's ship *Khuzistan*, which carried petrol and oil round the Gulf ports, became the centre of a squabble. International law requires all ships to be deratted once every six months. The *Khuzistan* used to go twice a year to Basra for this purpose. Suddenly the Persian authorities discovered that Basra had been omitted—clearly in error—from the list of ports approved of by the International Bureau in Paris as capable of issuing International Deratization Certificates. They were therefore within their rights in refusing to recognize the validity of such certificates issued in Basra. They demanded that the ship come down to Bushire twice a year for disinfection. The Oil Company replied that they were unable to go to the expense of sending the vessel to Bushire and back empty and that it was too dangerous to carry out the operation with the ship loaded. It is probable that in this matter it was not only a desire to stand upon their rights and to belittle the port of Basra that animated the Persian authorities. They also wished to pocket the fees which they would be entitled to charge. The deratting apparatus had yet to pay its way. The matter was easily settled by the placing of the name of the port of Basra on the roll of authorized ports.

A more serious complaint was that brought by the Government of India against the Quarantine Officer at Mohammerah for his failure to discover several cases of small-pox on board a vessel bound for Bombay. On 23 November ninety-three Irani gipsies embarked on the *Varela*. On arrival at Bombay no report of any infectious disease on board was made by the master. In consequence the ship was neither suspected nor quarantined. That night a child of one of the gipsies died and though they attempted to conceal the fact, the cause of death was found to be haemorrhagic small-pox. On the next day four more cases appeared. A close examination of the whole gang revealed that there was a boy of five among them who was convalescent from small-pox. On the following day three more cases occurred, all proving fatal within a few hours.

The Government of India put the blame upon the Persian Quarantine Officer who signed the clean bill of health at Mohammerah. The Persian Board of Health defended him and pointed out that the ship's doctor (an Indian assistant-surgeon) had also certified at Bushire (the next port of call after Mohammerah) that there was no infectious case on board. In the subsequent investigation the Indian doctor admitted that he suspected some disease among the gang, but failed to warn the port health authorities. He was dismissed from his ship and, I think, the honours in this case lie with the Persians.

During the year 1931 the bickering continued. This time it was the Persian authorities who laid complaints against the Iraqi Health Board. Unnecessary quarantine restrictions, they claimed, were being imposed upon Persian subjects in Fao. The facts are these. There was a mild outbreak of cholera in the Rafsindjan area, a district north of Bandar Abbas, in May of that year. The port of Bandar Abbas was not, however, declared infected. There had been no case of cholera in Basra or all Iraq since 1927. Three cases occurred at Basra on 27 July on board a vessel which had embarked several third class passengers at Bushire. As it was clear that the infection had been brought from a Persian port, the

Iraq authorities held that the Persian Gulf was infected. At the same time it was noted that the port of Bombay was reporting several cases of cholera with a serious epidemic in the province, a condition which was always associated with a spread of the disease into Persia and the Gulf ports. For this reason Iraq on 29 July applied the usual quarantine restrictions to all arrivals in the port of Basra from the Persian Gulf by land, sea and air. The Persian Government was immediately informed.

The geography of these parts is very complicated. All ships which enter the river, here known as the Shatt-ul-Arab, at Fao, also enter at the same time the port of Basra, because the limits of the port embrace all the waters of the Shatt-ul-Arab. The large Persian towns of Abadan and Mohammerah are 40 miles up the river from the sea; the Iraq town of Basra is 70 miles. Consequently ships passing to Persian ports are compelled to pass through Iraqi territorial waters to reach them. Large ships go straight to these towns and are dealt with by ordinary port and quarantine measures on arrival. Small coasting vessels which come from the western Indian ports, touch at various small uncontrolled ports *en route* and, when cholera is present in the Bombay Presidency, form a particular source of danger in the slow spread of the disease. Large numbers arrive at the Shatt-ul-Arab in the late summer and autumn to take cargoes of dates back along the Gulf.

On arrival at Fao these boats have to travel some 40 or 50 miles of river within Iraq territory to reach the Persian towns of Abadan or Mohammerah, a journey which usually involves one night's anchorage during a tide and in which the crew or passengers may land without much chance of interference at small villages on both the Persian and the Iraq sides of the river. They may thus carry infection to the shore. Port statistics of arrivals show that some passengers or crew almost invariably desert coasting vessels between Fao and the Persian towns.

Owing to these strange geographical limits a cholera epidemic was started this year which became very severe in Basra. The

imposition of strict quarantine kept the southern part of the province from Abul Khassib to Fao free except for an occasional imported case. Nevertheless, the strictness of the regulations gave considerable annoyance to the Persian authorities. Their case was that small boats were only coast traffic, passing through territorial waters at sea on their way to a port of their own nation. By imposing quarantine on these the port of Basra was contravening the International Sanitary Convention. The Basra authorities retaliated by claiming that *de facto* they were dealing with shipping touching at foreign ports. Their measures were abundantly justified, for not only was Fao kept free from disease but the corresponding area of Persia on the opposite bank of the river was also unvisited by cholera.

In May 1931 arrived the long expected Dr Coulognier, a General in the French Army and the sanitary expert lent to Persia. Dr Loqmán-ul-Mulk resigned his post as Director of the Health Department, having performed a difficult task for four years with considerable success.

On arrival the General found himself in charge of a sanitary service which, although subject to very severe criticism at times, had considerably improved during the past few years. It is true that no epidemic had arisen since 1927 to test it. It is true that lack of funds still militated against an efficient service. But the Persians had in these last few years acted with unwonted energy. The problem of contacts and carriers had been met by wholesale inoculations. Road frontier conditions had been improved. The Indian system of quarantine in the Gulf had been adopted in its entirety. The weak point was, as always, domestic as much as scientific. An outbreak of cholera at Quetta, for instance, revealed that at Mirjawa, the frontier station on the Duzdab (Zahidan)-Quetta line, there was no isolation house provided and that the local quarantine doctor could only apply for some unused railway huts for this purpose. At Mohammerah passengers undergoing isolation were confined in some army barracks, a quarter of a century old. In none of the quarantine houses

could the cooking, the sanitary or sleeping arrangements be considered satisfactory. In March 1932 the state of affairs was made the subject of an official protest by Sir George Buchanan at the Sanitary Conference in Paris. In his reply M. Rais, the Persian delegate, admitted that the state of affairs left much to be desired, but he claimed that already the Public Health Services were vastly improved and he hoped that under the aegis of General Coulognier this progress would be maintained. The British delegate was satisfied with this reply. The recognition of the Government of Iraq by the Persian Government removed another cause of friction. In fact, after a very stormy decade Persian medical affairs at last began to settle in a satisfactory and progressive manner.

CHAPTER XX

ARABIC RESEARCH AND MEDICINE

WHEN concluding his Fitzpatrick Lectures before the Royal College of Physicians in 1920 Professor Browne propounded two questions to his audience. The first was: How far can the fuller study of Arabian Medicine be regarded as likely to repay the labour that it involves? In this question there are two uncertainies. What meaning must be given to the word 'repay'? What does the student of Arabian Medicine expect to get as the result of his studies? And secondly, the beginner will very properly ask how much labour is involved. Upon that will depend what sort of reward he will expect. A full-time study demands a full-time salary.

Professor Browne certainly hoped that his lectures would inspire someone to make a study of this branch of Medicine, to specialize, as it were, in oriental historical Medicine. This is the first great difficulty, the first 'labour involved'. The student of Arabian Medicine must be well read in the theory, and very desirably also in the practice, of Medicine in general. Now this virtually demands that the research student be a qualified medical practitioner. This means at least seven years of concentrated study.

The student of Arabian Medicine must also know Arabic and be conversant with written Arabic as it has varied in the thousand years that have elapsed between the death of Muḥammad and to-day. He must be conversant with the variations of Arabic that occur between that written by the Moors in Spain and that written by the Indians in Delhi. And in between these people are all the variations of North Africa, Egypt, Syria, Iraq and Persia. But a knowledge of Arabic even thus wide is not sufficient. The Arabs came in contact with the Copts in Egypt, with the Sabaeans

in Syria, with the Christians in South Persia, with Zoroastrians all over Persia, with Hindus in India and Jews everywhere. Each of these had its own language and had built up a native Medicine inscribed in the native tongue. And each of these people added to and modified considerably that corpus that we now call Arabian Medicine.

Nor was Arabian Medicine stagnant. It is not as though the Arabs in their spread East and West carried with them a scientific system which, snowball-like, grew by adding foreign systems to their own native system. The conquering Arabs had no system of indigenous Medicine other than the crude folk Medicine of an uncultured people. They built up that system of Medicine which we now call Arabian Medicine by harmonizing and inter-moulding the various native systems with which they came into contact, just as a woman might knead into one compact mass various lumps of dough. It is therefore an obvious requirement for the student of Arabian Medicine that he be capable of studying the foundations from which that system grew.

Unfortunately this does not conclude the preliminary difficulties. Long before Islam was preached, a system of Medicine had evolved and almost expired, a system into which Arab genius infused new life. This system is now known as Greek or Hippocratic Medicine. Second only in importance to a knowledge of Arabic is a knowledge of Greek. It is quite impossible to study Arabian Medicine without the ability to recognize the Greek factors which underlie it and to be able to read at first hand the texts of Hippocrates and Galen. It would be equivalent to studying the architecture of St Paul's cathedral with no knowledge of the Parthenon.

As the Arab Empire broke up and the Eastern Caliphate disappeared, Persian became the vehicle in which Arabian Medicine was transmitted. When the Western Caliphate disappeared before the attacks of the Christians, Latin, the language of the victorious Church, became the medium in that part of the world over which the Cross rather than the Crescent reigned. Where the Crescent did survive, Arabic still remained the main language of medical

literature. But just as it would be insufficient to attempt to study Arabic medical literature of Turkey without some knowledge of Turkish, so the student of Arabian Medicine who wishes to embrace in his studies the whole period during which it flourished, must add to his attainments as well as Turkish a knowledge of Latin and Persian.

This sounds a very alarming list and may well make an aspirant to this line of research halt and reconsider his decision. But let him reflect that so little has been attempted as yet that there is a great deal of elementary and fundamental work still to be done which calls for considerable skill, it is true, but not for quite the same catholicity of knowledge.

The first thing required is more texts and more translations. So few are the published texts of writers of the Arabian School of Medicine, whether printed or lithographed, that I have been able to refer in the foregoing chapters of this book to the majority of them. There are still scores and scores of manuscripts scattered throughout the libraries of mosques, palaces, and museums which are quite unknown. Of many to publish the text is valueless, to translate them a waste of time. But so very few are available for students that many which ultimately will prove of no value should now be rendered accessible without the task being looked upon as a waste of labour. It is impossible to say dogmatically what is and what is not worthy of study until a larger number of authorities have had the opportunity to see and study them. I myself have for many years worked upon a medieval Persian manuscript. I completed the translation some years ago. When I looked at this work again in the light of greater knowledge, I came to the conclusion that the translation was almost valueless as a piece of historical or scientific research. The most that can be said is that no one else need follow the same line. The difficulty is to prevent anyone else from setting out on the same fruitless errand. I therefore had my work typed and bound and in that form offered it to the Royal College of Physicians of London. In that form it now rests in their Library.

Now, though any piece of work may prove valueless to another research worker, to me the labour involved in this research was far from valueless. First it taught me to read with ease the crabbed hand of the medieval copyist. Next it caused me to delve into and find out the correct equivalent of innumerable technical terms, botanical, medical and philosophical. Thirdly it taught me to recognize the ancient writers who were the source of the medical views of the fifteenth-century Persian authors. And finally, I learnt to love the intricate ramifications of the mind of an almost unknown medieval physician of Ispahan.

It is clearly not financially practicable to urge the publication of a large number of Arabic and Persian texts which may never be required, or if they are consulted, will be consulted but rarely. Nevertheless, I would counsel any young man or woman who is about to set out on this very enthralling line of research that he or she commence by studying one manuscript, any one hitherto not known, and that this study be concluded by translating into English, French or German that manuscript. Could not these translations, even if they do not get beyond the typewritten stage, be bound and placed upon the shelf of the Library of the Royal College beside my virgin effort? In this way there would be a gradual accumulation of texts which would act like the rungs of a ladder for each succeeding generation of students. There are so many manuscripts available and unknown, some of which must contain matter essential for a complete study of the growth and extent of Arabian Medicine. No man has time to read them all; and to skim an Arabic manuscript as one skims a printed text, well, it just cannot be done. There is a crying need for more texts and more translations, more especially of those works which were composed after the Mongol invasion of Persia and Baghdad.

Another great difficulty which the student of Arabian Medicine will meet is the absence of a scientific and accurate dictionary. There are glossaries attached to most of the few published translations. The less modern are these translations, the less accurate are the glossaries. Even the most modern are either inaccurate or

give only the local meanings attached to technical terms. The eighteenth- and nineteenth-century glossaries are practically valueless. Medical nomenclature recently has so much changed that it is impossible that it should be otherwise. This would seem to be a very suitable moment to publish a large and up-to-date scientific dictionary after the model of Liddell and Scott's *Greek Lexicon*. The Royal College of Physicians has lately revised all technical terms (see *The Nomenclature of Diseases*, 6th ed., H. M. Stationery Office, 1931) and on this basis the translation of Persian and Arabic medical terms could also be standardized by anyone with sufficient knowledge of the subject. I have begun such a work.

In the face of such a formidable preparation it would be reasonable for the student to expect a large 'repayment'. If this is to be interpreted in terms of money or fame, I doubt if he will consider the return satisfactory. Scattered among the various pharmacopœias and the therapeutic sections of Arabic and Persian medical works there may be some excellent remedies once discovered and now lost. But I doubt it. It must be rare for a good and proved remedy to drop out of man's knowledge. I have suggested in the previous pages that there may have been some form of anaesthesia of which we are now ignorant. But it is highly improbable that it was more satisfactory than are our modern methods.

A few vegetable or animal drugs may have been employed and gained an empirical success and then forgotten. Ephedrin would seem to be one such. It grows wild in Persia, but it was recently introduced into Europe from China.

A few clinical oddities may have been remarked and incorporated into manuscripts no longer read and now await fresh discovery. Such were the heart involvement in Grave's Disease, the infectivity of whooping-cough, and the hay-fever which roses can produce in some people. These I have already noted in their proper places. There may be others still concealed, but they are not so important that they will bring wealth or fame to whoever re-discovers them.

It is not upon such grounds that further study of Arabian Medicine is justified. This is what may be termed the narrow scientist's point of view. Nor can it be justified, I think, upon the narrow orientalist's point of view. That scientific literature is a definite branch of oriental letters cannot be denied. But it is a dry and dusty path. 'Science is twofold: Theology and Medicine,' said the Prophet. And the study of an outworn medical creed is as sterile as the study of an outworn theology. No: not from such a point of view can further study be recommended.

It is only when these two aspects are united, when the objective is no longer of immediate practical application, when the health of neither the body nor the soul is the supreme quest that there is found abundant justification for a further and more intense research. A study of Arabian Medicine demanding, as it does, a study of its Greek ancestry, is in reality a study of the embryo of modern science. It is more than that: it is a study of the conception of that Medicine to which more and more modern thinkers are turning. Medicine is moving, as it were, in a great circle and is approaching the point once more at which the Persians and the Arabs picked it up. Names indeed have changed: yet even here there is less change than one would credit. Modern discoveries, such as the microscope, X-rays, electrical measuring devices have guaranteed that the circumference of the circle upon which we move will never quite coincide with the circumference of the Persians of old. But the basic ideas of the Persians, that Man is a distinct individual, that no two men are exactly alike, that a disease is a disease of the whole of man and not of a part, these views are also the views of the modern thinking man. Gone are the days when man was 'an uninteresting vehicle of a fascinating disease process'.

Far too long has the scientific Medicine of the nineteenth century distracted the attention from the patient to the disease. An extreme illustration is that of the unfortunate patient who was bandied about between medical and surgical wards and submitted to a number of exhausting examinations. All this because he had

in addition to an unusually low blood pressure multiple tuberculous lesions and a very low sodium content in his blood. The physician in charge of the case ended his report without any suggestion of surprise by remarking that 'the patient seemed to withdraw markedly from his surroundings and to sink into a definite depression'.

Is our modern Medicine suffering from delusions of grandeur? All is not well in the relationship between patient and doctor. Perhaps the orthodox physician has always been inclined to give himself pontifical airs and to disregard the individuality of the patient. The result of such an attitude has always been the growth of quackery. The theosophy of to-day represents the charlatanism of medieval Baghdad.

The best that can be said for this domineering attitude is that it does at times effect a cure just because of the truth of the dictum that the patient is primarily an individual and not a case. For it makes possible the exercise of the healing influence of a strong personality over a weak and ailing one. Sir William Gull was once descanting at dinner upon his favourite topic that the successful medical man must be a bit of a quack. It is the old story, he said; *plebs vult decipi*. Dr Martin, a fellow-guest, promptly translated this as 'the public likes to be gulled'.

Underlying our conception of the sick man must first be our study of the healthy man. This is the science of physiology. Their physiological system the Persians borrowed from the Greeks. It is in consequence known as the Hippocratic System and, because it is based upon the four humours of the body, it is also known as the Humoural System. They held that upon the maintaining of an equilibrium between the humours depends a man's bodily health. To explain the operation of these non-existent humours an entirely erroneous physiological view of the functions of the arteries, veins, and nerves was invented. A completely false explanation of disease and its causes, and hence of its treatment, followed the acceptance of the Humoural Theory.

But the truth or falsity of the theory is of no importance. It

served the Arabs and the Persians for five hundred years. It had served the Greeks and the Romans for a thousand years before that. For it expresses a fundamental psychological truth. The physicians of all these peoples had found it necessary in their approach to disease to classify first their patients into various types before they could attempt to recognize the maladies from which they were suffering. Only then could they give the appropriate treatment. Modern physicians, more especially modern psychiatrists, have the same need. Only the technical terms have changed. It is as important to us as it was to them.

The Persians pushed this theory a stage further. To them these humours represented both a physiological and a metaphysical conception. They were conceived of as corresponding closely to the four elements. Just as everything in Nature is composed of the four elements—air, fire, earth and water—so the personality of man, his ego, is the resultant of the four humours. And these correspond to the elements. Perhaps it is not too inexact to express the idea in Aristotelian language. The substance of Man is formed by the elements, the accidents of Man by the humours. From this arose the further doctrine that Man represents in himself a microcosm, that he is the World in miniature. The humours are therefore sometimes called the Daughters of the Elements. And it is not difficult to see that this theory of the temperament of the humours links up the humoural theory with the homeo- and allopathic theory of disease and hence is fundamental to one of the great unorthodox systems of Medicine of to-day.

The supreme importance of this intricate system of physiology is that it converted Medicine from a mere magical cult to an art with rules of its own which encouraged clinical observation. As such it survived throughout almost the whole of the period with which I have dealt in this book. It was shaken by Harvey when he published his discovery of the circulation of the blood and very slowly the Humoural System gave way to the Circulatory Theory. But so insufficient was Harvey's theory to explain disease that the underlying conception of the Arabian System survived until the

materialists attacked it in the eighteenth and nineteenth centuries. It was left to Virchov to declare that 'there is no such thing as a sick body that is disordered in all its parts. I maintain that no doctor can systematically think of a morbid process unless he is able to assign to it a place in the body.' The wheel had moved the full half circle away from the Persian conception.

But such gross materialism did not last long. First came the role of the central nervous system with its glandular control; then came the breakdown of the dualism of mind and body under the assaults of psychologically-minded physicians, when disease and unhappiness alike were seen as the resultant of forces in the individual and his environment. Finally, when Berthold found that the implantation of testicular grafts into castrated cocks restored their appearance to that of normal birds and thus demonstrated that the testicles must pass some substance into the blood which reacts on the organism as a whole, the proof was complete. The Neo-Hippocratic or Neo-Humoural System was born. The turn of the wheel was complete.

The Neo-Humoural Theory, just like the old, not only considers the relation of the organs to the medium surrounding them, but also that of the individual to his usual environment. It is known that the vitality of living beings varies with changes wrought in their surrounding media. Differences in hydrogen-ion concentration influence osmotic pressure and thus the cellular function of organisms. Potassium, calcium and other inorganic ions have wide effect on cellular pathology, influencing structure, permeability and resistance of cell membranes. A minute portion of calcium chloride injected into the brain of a dog causes him to go to sleep: potassium chloride under the same conditions may cause epilepsy. An acid diathesis is said to predispose an individual to juvenile ailments, while an alkaline diathesis leads to disorders of old age. The astonishing foundations upon which this theory rests have been admirably set out in the *Revue Médicale de la Suisse Romande* of 25 April 1933. They make very interesting reading if an Avicenna lies open on the table at the same time.

Is there any need to justify at greater length a further study of Arabian Medicine? Is there any need to point out that a nation or profession which abandons its traditions and ceases to know the course of those traditions is by that very act convicted of decay? Is there any need to justify historical research into any branch of history? It there any need to call attention to the fact that only by taking the broadest possible view can a just perspective be gained of the age and epoch in which we live?

But there is a second question that Professor Browne put to his audience. Supposing that the fuller study is justified, he said, then how should that study be pursued in the future and what parts of the subject most merit attention? The first part of the question has, I think, already been answered. Clearly for many years the best way to pursue this study is to make more facts available. The expert in Arabic must give to others less expert in that language more and more of the early texts together with translations, if possible, at least with commentaries. The Syriac expert, the Hebrewist, the Old Persian scholar will have even more to give, for very very few know sufficient to be able to compare the Persian of pre-Islamic days with the written Persian of medieval times.

For the present the need is for all parts of the Arabian medical system to be made accessible. The time will come when certain portions of the medical manuscripts can safely be neglected. I imagine that the first of these will be the sections on drugs. Already one is beginning to feel that too much time has been spent on fruitless attempts to identify botanical names. Names must have varied from place to place and it is idle to expect consistency. Confusion must always have existed owing to the wide variations in one and the same species produced by the extremes of climate within which Arabian Medicine held sway. I feel sure that the Arab and Persian writers themselves must often have made the grossest errors through ignorance and lack of care in checking their descriptions.

Next I feel that the therapeutic parts of medical manuscripts will safely be neglected. Research into major and minor surgical

proceedings will repay the time involved for many years. So will further elucidation of chemical technical works. Medical astrology, too, has been completely neglected. But the sections of the manuscripts on general medicine that deal with the administration of drugs can, I am sure, go into the limbo in which already lie the drugs themselves.

Clinical observations will always be of interest. They may not add to medical knowledge, but they usually portray the physician's character and frequently have a bearing on some historical aspect of the nation or the period. Medical anecdotes never weary.

But far more important than these is the philosophy and psychology that underlie all these works. Here is to be found a return to the first principles which are still in dispute. What is Disease? Fashion influences this fundamental conception. The reality of diseases as independent entities has been supported, challenged, reasserted within living memory. Is Disease a metaphysical abstraction, as Broussais asserted? Can it be defined and classified like a plant, as Sydenham essayed? Is the last word with the histologist, the bio-chemist or the bacteriologist? Until these and similar questions are finally answered, the thoughts of the great Arab and Persian scientists will continue to be worthy of study. Who would dream of studying moral philosophy without reading Aristotle and Plato? Arab and Persian views are worth as much as our own on these great fundamental questions. 'It is unwise', wrote the late Dr James Collier, 'to sneer at what the past has done, unwise to extol what your own generation has performed, and most unwise of all to denounce too quickly what a succeeding generation is doing.'

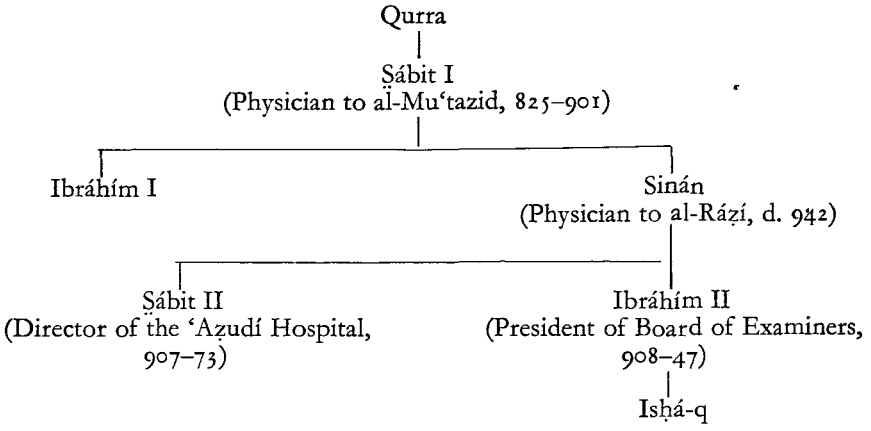
Though the methods differ, the objective is the same. Harvey placed the experimental method of approach to medical problems on a level which makes it almost sacrilege for anyone to attack. As far as clinical medicine is concerned the last word will always rest with the experimentalist. But even in clinical medicine problems arise which are out of reach of experiment. Man is so much more than flesh and blood. In such realms the Arab and the

Persian can speak with an authority equal to that of the German and the Frenchman. He puts forward opinions which should be set beside those of Greek and Roman philosophers. Did Avicenna approach nearer to what we now believe to be the true aspect of disease than did Galen? Did Rhazes give to clinical symptoms a juster appreciation than did Hippocrates? This, surely, is a fundamental question which only a study of the Arabian School of Medicine can answer. And this, surely, is what Professor Browne meant when he questioned whether a further study of the subject was worth while.

Medicine is international and recognizes frontiers neither of Time nor Age. National Medicine is a contribution to Medicine as a whole and must never degenerate into Nationalist Medicine. Galen, Avicenna, and Sydenham are heroes first of Medicine and only secondarily of the nations that begat them. The medical historian recognizes a spiritual kinship between all men who face the same problems of health and disease. To neglect any part of that family is to weaken the whole Tree. This is why further study of Arabian Medicine repays the student. He is completing a picture which is still far from complete. He is fitting into the puzzle those bits which have for so long lain neglected although so close at hand. And just as the picture of the jigsaw often lies hidden until the last few pieces are added, so it may be that Arabian thought with its synthesis of Indian and Chinese philosophy, may throw light on some of the dark problems which elude solution to-day.

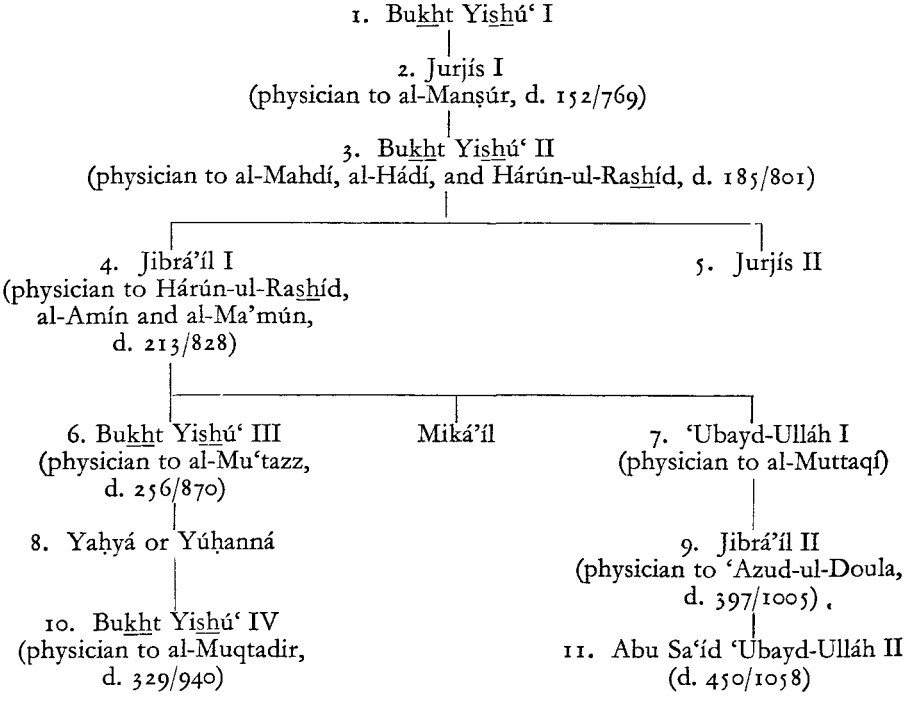
> That way
> Over the mountain, which who stands upon
> Is apt to doubt if it's indeed a road;
> While if he views it from the waste itself,
> Up goes the line there, plain from base to brow,
> Not vague, mistakable.

GENEALOGICAL TREE OF THE QURRA FAMILY



GENEALOGICAL TREE OF THE BUKHT YISHÚ' FAMILY

(after Browne's *Chahár Maqála*, p. 145)


1. Bukht Yishú' I
2. Jurjís I
(physician to al-Manṣúr, d. 152/769)
3. Bukht Yishú' II
(physician to al-Mahdí, al-Hádí, and Hárún-ul-Rashíd, d. 185/801)
4. Jibrá'íl I
(physician to Hárún-ul-Rashíd, al-Amín and al-Ma'mún, d. 213/828)
5. Jurjís II
6. Bukht Yishú' III
(physician to al-Mu'tazz, d. 256/870)
Miká'íl
7. 'Ubayd-Ulláh I
(physician to al-Muttaqí)
8. Yaḥyá or Yúḥanná
9. Jibrá'íl II
(physician to 'Azud-ul-Doula, d. 397/1005)
10. Bukht Yishú' IV
(physician to al-Muqtadir, d. 329/940)
11. Abu Sa'íd 'Ubayd-Ulláh II
(d. 450/1058)

NOTE. Wustenfeld, following Ibn abi Uṣaybi'a, inserts a Jibrá'íl between Jurjís (2) and Bukht Yishú' (1). But al-Qifṭí represents Jurjís I as the son, not the grandson, of Bukht Yishú' I.

INDEX

In the following index the prefixes 'abu' ('father of...') and 'ibn' ('son of...') are disregarded in the arrangement of Muhammadan names into which they enter: thus, for example, such names as Abu Tahir and Ibn Sina are to be sought under 'T' and 'S' respectively. Similarly the Arabic definite article 'al-' is to be disregarded. So the title al-Muktafi will be found listed under 'M'. The letter 'b.' between two names stands for 'bin' or 'ibn' ('son of').

For typographical reasons it has been found necessary to omit in the index the accents indicating the long vowels and the dots and dashes that distinguish different forms of the same letter. The correct transliteration of such words must therefore be sought in the text.

Aalam-ul-Mulk, Dr, 547
Abaqa Khan, 307, 309, 311
'Abbas I or the Great, 38, 243, 293, 349, 352, 361, 365, 366, 382–5, 393, 414
'Abbas II, 385–8, 393
'Abbas Mirza, son of Shah Sulayman, 389
'Abbas Mirza, son of Fath 'Ali Shah, 392, 445, 446, 449, 451, 452, 453, 455, 456, 457, 458, 462, 464–9, 474, 476, 478, 479, 483, 497, 509
Abu ul-'Abbas, *see* Ma'mun b. Muhammad Khwarazmshah *and also* al-Saffah
Abbasabad, a village, 452
Abbasah, wife of Ja'far the Barmecide, 85
'Abd-ul-Latif al-Baghdadi, physician, 204, 332
'Abd-ul-Majid, Indian doctor, 375
'Abd-ul-Malik, benefactor, 170
'Abd-ul-Rahman b. Nasr Shirazi, 296
'Abd-ul-Rahman al-Sarakhsi, 123, 219
'Abd-ul-Salam al-Baghdadi, 360, 361
'Abd-Ullah, father of Khalid the Barmecide, 80
'Abd-Ullah, b. Jibra'il, 161
'Abd-Ullah Khan Istajlu, 349, 382
'Abd-Ullah al-Tayfuri, *see* al-Tayfuri
'Abd Yishu' b. Nasr, physician, 77, 78
Adcock, Dr, 526
Adenbeck el-Hakim, 225
'Adil Shah, 368, 437
Aesculapius, 2
Agha Muhammad Qajar Shah, 392, 423, 437, 438, 457, 468
Aghraz-ul-Tibb, of al-Jurjani, 218, 239, 356
Agrabazin fi Ilm-i-Tibb-il-Khayl, 319
Ahmad the Apostate, *see* Takudar Oghlu
Ahmad ibn Buwayh (or Mu'izz-ul-Doula), 152, 153
Ahmad Issa Bey, Dr, 243
Ahmad b. Mardavij, 144
Ahmad b. Musa, 102
Ahmad b. Sahl al-Balkhi, 196
Ahmad Shah, 539, 556
Ahmad b. ul-Tabib al-Sarakhsi, 123
Ahmad b. Tulun, 177
Ahmad 'Umar Samarqandi, 234
Ahmad Yunis, 134
Al-Ahnaf b. Kais, 293
Ahrun, priest of Alexandria, 99, 100
Ahsan-ul-Tawarikh, 306n., 361n., 379
Aims, The, of al-Jurjani, 218, 239, 356
Aja'ib-ul-Makhluqat, of al-Qazvini, 65, 322
Ajwini, abu Bakr, writer, 239
Ibn 'Akasha, surgeon, 228, 290
Akbaradi, Muhammad Isma'il, 415
Akhlaq-i-Nasiri, of Nasr-ul-Din Tusi, 158
'Ala'-ul-Din Khwarazmshah, 215
'Ala'-ul-Doula Atsiz, 215, 218
'Ala'-ul-Doula Hasam-ul-Din, 190
'Ala'-ul-Mulk, minister, 219, 226
Alai, Mirza Muhammad Khan, physician, 548
'Alam Arai, 357n., 360n.
'Alam-ul-Doula, that is Dr Khalil Shafaghi, 564
'Alamgir, emperor of Delhi, 63, 304
'Alavi Khan, Mirza Muhammad Hashim, 374, 415, 416, 419
Albehazen Hali, 157
Albo, Dr, 501, 512
Aleppo, 393, 427, 431
Alexander the Great, 6, 28, 33, 38, 45, 54, 116, 250, 264, 319, 442
Alfarabius, that is al-Farabi, 407
Alfaz-ul-Adviya, of 'Ayn-ul-Mulk, 282, 373
Alfiyya Shalfiyya, 117, 295

Alhazen, 136, 137
'Ali, son-in-law to the Prophet, 404
'Ali Afzal Qazvini, 264, 354
Abu 'Ali b. Ibn-il-'Attar, 228
'Ali Buwayh, *see* 'Imad-ul-Doula
'Ali b. 'Isa ibn ul-Jarrah, 131, 175
'Ali b. 'Isa, the oculist, 112, 137, 140–2, 282, 284
'Ali b. 'Isa, the *wazir*, 129, 130, 147, 152, 247, 249
'Ali Khan, son of Lutf 'Ali Khan, 392
'Ali b. Mirza Mas'ud, 488
Abu 'Ali Muhammad al-Basrawi, 136
'Ali Quli Khan, *see* 'Adil Shah
'Ali Quli Mirza (or I'tizad-ul-Saltana), 502
'Ali Ra'is-ul-Atibba, 502
'Ali b. Rizvan, 2, 221, 222, 246, 257
'Ali al-Sadr, 356
Abu 'Ali b. Sina, *see* Avicenna
Ibn Allahlaj, physician to al-Mansur, 75
Almagest, of Ptolemy, 101, 190, 191
Alp Arslan, 211, 212, 224
Alpagus, physician, 94
Alves, Mr, surgeon, 362
Amasis, 21
Amherst, Lord, 449
Ibn ul-'Amid, 199
'Amid-ul-Mulk, *wazir*, 211, 212, 214
Amida, the modern Diabekr, 42
Amidi, Dr, 579
al-Amin, 6th 'Abbasid Caliph, 85, 96, 97, 160, 257
Amin-ul-Doula Hibat Ullah, 162, 165, 227, 230
Amin-ul-Doula abu ul-Faraj Yahya, 165, 167
Amin-ul-Doula Khwaja, 309
Amir Aalam, Dr, 563, 564, 567, 571
Amir Mu'izz-ul-Din Ispahani, 357
Amir Nizam, *see* Taqi Khan
'Ammar b. 'Ali al-Mosuli, 138, 142, 143, 236, 286, 299
Amoenitatum exoticarum fasciculi, of Kaempfer, 407
Amsterdam, 367
Anaesthetics and analgesics, 281–5
Ananga Ranga, an Indian work, 296
Anayza, *amir* of, 393
al-Andalusi (also named al-Bahali), 174
Andarz-i-Buzurgmihr, 40
Andrew the Jew, 206
Angelus of S. Joseph O.C., Rev. Fr., 366, 367, 368, 399
Anis-ul-Musharrahin, 375
Annals of Medical History, 378, 379
al-Ansari, Hajji Zayn-ul-Din, 50, 363, 364, 366
al-Ansari, Husayn Jabiri, 201
al-Ansari, Shaykh 'Abd-Ullah, 250
Anthony, the Triumvir, 42
Antidotarium, of Ibn Serapion, 53
Antioch, 42, 47, 53
Antyllus, a surgeon, 138
Anusharwan, *see* Nushirwan
Aphorisms, of Hippocrates, 106, 239
Appollonides, a physician, 26
Aqarabadin-i-Kabir, of Sabur, 92
Arabian Medicine, of Browne, 156n., 216, 312
Arabian Nights, 81, 179, 180, 183, 235, 248, 253, 256, 267, 273, 274, 331, 374
Arda-viraf, a magus, 37
Ardebil, a town, 349, 352, 356, 387, 398, 462
Ardawan, a Parthian king, 37
Ardeshir, founder of Sassanian line, 37, 38, 62
Arghun, son of Abaqa, 308, 309, 310, 313
Aristotle, 29, 30, 31, 33, 52, 116, 184, 190, 191, 343, 345, 594; sword of, 37
Arius, a bishop, 46
Armengaud, a commentator, 207
Arnold of Villanova, 207
Ars Parva, of Galen, 110, 111
Artaxerxes I (or Longimanus), 24, 41, 42
Artaxerxes II, 25, 27
Artaxerxes III, 27
Arzani, Muhammad Akbar Shah, a physician, 63, 304, 374
Asad b. Jani, 173, 258
al-Asbab wa al-'Alamat, of al-Samarqandi, 304
Asfar b. Shirawayh, 144
al-A'sha, a poet, *see* Maymun b. Qays
Ashtangahradaya, an Indian physician, 372
Ibn ul-Asir, 170, 276
Aspasia, wife of Cyrus, 18
Astrabad, 437
al-Astralabi (also called al-Badi'), 168, 169
Astronomical Tables of al-Badi', 169
Atishak, *see* Syphilis
Atossa, wife of Darius, 23, 24
Ibn ul-'Attar, abu ul-Khayr al-Masihi, 228, 229, 303
Ibn ul-'Attar, Hajji Zayn-ul-Din, *see* al-Ansari
Ibn ul-'Attar, 'Isa b. Yusuf, 146
Aubrey, friend of Harvey, 184
Augustin S.J., Rev. Fr., 419
Aurelian, emperor of Rome, 47
Aurungzeeb, emperor of Delhi, 373, 374, 416

Avenzoar (that is, Ibn Zuhr), 94, 370
Averroes (that is, Ibn Rushd), 404, 407
Avesta (or *Zendavesta*), 5, 7, 8, 9, 17, 287
Avicenna (that is, Ibn Sina), 31, 74, 80, 94, 137, 153, 156, 157, 158, 162, 184–95, 202, 204–9, 214, 216, 221, 235, 236, 238, 240, 245, 258, 279, 280, 282, 283, 286, 287, 288, 289, 290, 294, 299, 303, 307, 308, 309, 327, 328, 329, 330, 334, 335, 336, 340, 341, 342, 352, 353, 370, 372, 373, 375, 376, 404, 407, 437, 536, 592, 595
Ayesha, daughter of Abu Bakr, 64
al-'Ayn, of Najm-ul-Din, 143
'Ayn-ul-Mulk Shirazi, Nur-ul-Din, 282, 373, 374
Ayub of Edessa, 110
abu Ayub, a courtier, 362
Azad Khan Afghan, 392, 426, 427
Azerbaijan, first appearance of syphilis in, 377
'Azud-ul-Doula, 70, 80, 128, 133, 142, 150, 157, 160, 161, 171, 172, 193

Baba Shirazi Malik-ul-Atibba, 465, 474, 475, 482, 495, 511
Babur, first Moghul emperor, 373, 378
de Bacher S.J., Rev. Fr. Aloys, 419
Bachkam, a general, 148, 149, 152, 416
Badayi'-ul-Hikmat-i-Nasiri, of Dr Tholozan, 518
Badayi'-ul-Insha', of Yusuf b. Muhammad 378
Badi'-ul-Jamal, a princess, 364
Badi'-ul-Zaman, a writer, 180
Badi'-ul-Zaman, a physician, *see* al-Astralabi
Baghdad, 33, 42, 47, 58, 70, 71, 75, 76, 81, 86–89, 93, 97, 100, 101, 102, 105, 109, 112, 114, 115, 119, 128, 131–4, 144, 145, 148, 149, 150, 151, 153, 154, 157, 158–62, 164, 165, 166, 170, 172, 173, 184, 197, 210, 211, 212, 220, 221, 224, 230, 235, 238, 239–42, 244, 247, 250, 256, 259, 260, 267, 268, 279, 284, 305, 306, 310, 312, 317, 318, 320, 323, 324, 328, 329, 331, 335, 353, 366, 368, 372, 384, 385, 394, 395, 412, 429, 432, 433, 434, 435, 439, 440, 459, 460, 462, 463, 488, 489, 507, 515, 520, 543
al-Bah fi Hukm-il-Nabbi, of al-Suyuti, 296
Baha'-ul-Doula, 180, 210, 251 n., 266, 280–3, 287–90, 294, 353, 354, 355, 361, 363, 365, 372, 377, 380
al-Bahali, poet and physician, 174
Bahman Mirza, brother of Muhammad Shah, 494, 497, 500
Bahr-ul-Jawahir, of Muhammad b. Yusuf, 186 n., 378
Bahram III (also called Varahran), 40, 47
Bahrami Senior, Dr, 570, 571, 572, 575
Bahrami Junior, Dr, 577, 578, 579
Bahrein, 429, 430
Baigrie, Dr, 462
Baker, Dr J. E., 510, 517, 520
abu Bakr, son-in-law of the Prophet, 58, 64
abu Bakr, Muhammad b. Khalil, 111
Abu Bakr, Muhammad al-Shibli, 129
Abu Bakr, 'Ubayd-Ullah, *see* Ibn ul Maristani
Ibn Baks, Ibrahim, 161
Balkh, 62, 80
Bandar Abbas (formerly called Gombroon), 394, 395, 396, 397, 399, 400, 401, 407, 409, 410, 411, 412, 413, 417, 422, 424, 425, 426, 427, 428, 429, 576
Bandar-i-Rig, 399, 425, 426
Baqia, abu 'Isa, a physician, 161
Baqir Khan, a general, 487
Bar Hebraeus, vi n., 1 n., 99, 109, 128, 143, 157, 167, 184 n., 195, 227, 266, 306, 307, 320
Baratov, a general, 546
al-Baridi, a *wazir*, 148
abu ul-Barkat Hibat Ullah, 167, 168, 245
Barmak, a physician, 80
Barr'-ul-Sa'at, of Rhazes, 201
Barthelemey, Dr, 511
Basra, 61, 86, 412, 425, 429, 430, 431, 432, 433, 434, 439, 440, 459, 460, 462, 463, 509, 522, 574, 579, 580, 581, 582
ibn abi Batiha, an inspector, 240
al-Batriq, abu Yahya, 30, 104, 116
Batriq, Yahya b. ul-Batriq al-Zakariyya, 116, 117
ibn Batuta, a writer, 171, 232
ibn ul-Bayan, a pharmacist, 275
Bayazid II, sultan of Turkey, 351, 356
Bayt-ul-Hikmat, 104, 123
ibn ul-Baytar, 100, 223, 353, 363
Bazanes, a physician, 51
Bazin S.J., Rev. Br., 368, 414, 415 n., 418 n., 419, 420, 421, 422, 423
Behzad, a painter, 352
Bell, Dr, 477, 480, 496, 497
Benjamin of Tudela, 172
Bergstraesser, Prof., 110
Bethune, Sir Henry, 469, 470, 473, 474, 475, 480, 487
Bezoar Stone, history of, 369–71; its uses, 405
Bibliothèque Nationale of Paris, 101, 213 n., 218, 374 n.
Bidwell, Mr Hugh, 413

Bimaristan-ul-'Azudi, 71, 159–66, 169–72, 177, 178
Bimaristan-ul-Firati, 133
Bimaristan-ul-Muqtadiri, 132, 133
Bimaristan-ul-Sayyida, 132
Bird, Miss Mary, 534
al-Biruni, a writer, 52, 137, 187, 198
Blandy, Mr, 418
Bodleian Library of Oxford, 364
Boerhaave, Dr, 427
Bombay, 398, 412, 424, 429, 432, 433, 434, 440, 442, 443, 444, 446, 449, 459
Bonnevaux, Mr, 431
Bogle, Dr, 439, 440
Book of Anatomy, of Yuhanna b. Masawayh, 328
Boyce, Dr Thomas, 396
Briggs, Dr, 440, 442, 443
British Medical Journal, 290n.
British Museum, 53, 381, 395, 408
Brockelmann, 157, 184n., 213
Brough, Dr Richard, 396
Browne, Prof. E. G., v, vin., viii, ix, 91n., 114, 125, 156n., 174, 188, 192, 193, 199, 212, 216, 218, 225n., 239, 240, 312, 455n., 518, 584, 593
Browne, Sir Thomas, 31
Browne, Mr William, 431
Bruce, Rev. Robert, 534
Buch der Auswahl of Hirschberg, 286
Buchanan, Sir George, 583
Budge, Prof., 112
Bukhara, 391, 464
Bukht Yishu', family of, 86, 89, 107, 596
Bukht Yishu' I, 75
Bukht Yishu' II, 70, 76, 78, 79, 88, 120, 158, 257, 258, 268, 270
Bukht Yishu' III, 86, 107, 108, 118, 119, 120, 328, 360
Bukht Yishu' IV, 132, 146
Bundahishn, 5, 20
al-Bundari, a writer, 172n., 175n.
Buqrat, *see* Hippocrates
Burton, Lady, 297
Burton, Sir Richard, 297
Burujird, 458
Burzoes Einleitung zur dem Buche Kalila wa Dimna, of Noeldeke, 52
Burzuya, *see* Perzoes
Bushire, 429, 430, 431, 441, 442, 443, 446, 448, 450, 459, 472, 486, 487, 524, 530, 576, 577, 579
al-Bushkani, Sharaf-ul-Din, 308
Bussiere, Dr, 530, 531
Bustan, of Sa'di, 339n.
Ibn Butlan, 150, 162, 213, 221, 222, 223, 257
Buzurjmihr, *see* Perzoes

Cain, 1
Calcutta, 373, 374, 375, 435, 440, 441, 442, 443, 492
Cambyses, 21, 22
Campbell, Dr, 442, 444, 445, 446
Campbell, Capt. Donald, viin., 94
Campbell, Capt., afterwards Sir Robert or Sir John, 459, 460, 461, 463, 464, 465, 468, 472, 481, 491, 494
Canon (*Qanun*), of Avicenna, 80n., 114, 115, 140, 156, 157, 186, 190, 194, 195, 196, 199, 203n., 206, 207, 209, 216, 218, 219, 220, 239, 240, 246, 282, 288, 294, 303, 307, 308, 309, 335, 354, 370, 373, 376
Canones Generales, of al-Marindi, 93
Canticum, of Avicenna, 207, 309
Capuchin Fathers, 368
Carapit, Abraham, apothecary, 480
Carlton, Dr Samuel, 396
Carmelite Fathers, 366, 367, 383, 533
Carmenia, *see* Kerman
Carnegie, Dr David, 432
Carr, Dr D. W., 534
Carrhae, attack on, 38
Carus, emperor of Rome, 40, 41
Casey Wood, a writer, 140, 141, 286
Castaldi, Dr, 519, 520
Castlereagh, Lord, 445
Catalogue de la Compagnie de Jésus, 419
Celsus, 137
Chahar Maqala, of Nizami, 204, 216n., 234n., 239, 258n., 360n.
Chain of Gold, The, of Jami, 194
Champier, 209
Charaka, 372
Chardin, Sir John, 275n., 292, 367, 398
Charlemagne, 205
Charles I, King of England, 396
Chaulant, 347
Chauliac, Guy de, 208
Chess, introduction of, into Persia, 54
China Root, 365, 381, 419
Chinghiz Khan, 220, 230, 232, 302, 303, 348
Chosroes, King of Armenia, 38
Chosroes I, or the Great, *see* Nurshirwan
Chosroes II, 55, 56, 58
Christensen, vin., 39n.
Chronicle of the Carmelites in Persia, A, 368n., 383n., 389n., 391n., 394n., 399n., 419, 479n., 512n.

Church Missionary Society, viii, 533
Cicero, 184
Clarke, an adventurer, 469
Clearchus, a Greek general, 26
Cleland, Dr William, 432
Clift, Mr, Paymaster, 409, 410
Clive, Sir Robert, 569
Cloquet, Dr, 496, 498, 500, 506, 511
Cochran, Dr J. P., 533
Collier, Dr James, 594
Colville, Dr, 519, 520
Commentary on the Traditions of the Prophet, of Ibn ul-Tilmiz, 167
Compendium of the Mansuri, of Rhazes, 196
Conon, an admiral, 27
Constantine the African, 329
Constantine, emperor of Rome, 41
Constantine, the translator, 113
Constantinople, 44, 56, 58, 109, 350, 393, 432, 435, 509, 519, 521
Constantius, emperor of Rome, 41, 42
Contes du Chaykh el Modhy, 120, 179, 266n.
Continens, of Rhazes, 53, 93, 100, 111, 116, 139, 140, 185, 198, 199, 201, 202, 206, 207, 218, 239, 307, 354, 370
Contra Arabum Traditionem, of Champier, 209
Cook, Dr John, 273n., 291, 415n.
Coppin, Dr, 531, 532
Coradinus Gilinus, an historian, 377
Cormick, Dr John, 445, 446, 452, 456, 459, 463, 464, 465, 466, 467, 469, 472
Cormick, Dr (son of Dr John), 497, 500
Cornelius Agrippa, 209
Cotton, Sir Dodmore, 395
Coulognier, Dr, 582
Cox, Lady, 553
Cox, Sir Percy, 545, 554
Crassus, 42
Critobulus of Cos, 29
Crusades, 224, 225, 226
Ctesias, son of Ktesiechus, 26, 27
Ctesiphon, 41, 42, 43, 55, 56, 81
Cunaxa, battle of, 26
Cyrus the Great, 21, 42
Cyrus the Younger, 18, 25, 27

Daghal-ul-'Ayn, of Mesue Senior, 92
Dalrymple, Mr, 424
Damascus, 68, 98, 306, 307
Damian of Lyons O.C., Rev. Fr., 368, 391, 416
al-Damiri, a writer, 361
Daniel b. ul-Tayfuri, 90
Danishnama-i-'Ala'i, of Avicenna, 189, 193
Darius Codomanus, 27
Darius the Great, 22, 23, 24, 32, 98, 264
Darius, 9th and last Achaemenian king, 21
Darius Shikuh, 373
Dar-ul-Fanun, founding of, 502
Dastur-ul-'Amal Khurdan-i-Sharab, of Qazi b Kashif-ul-Din, 283
Da'ud b. Hunayn, 116, 139
Da'ud b. Sarabiyun, 77, 79
Da'ud al-Zahiri, 259
David Armenicus (or Hermenus), 142
Daylam, a physician, 270
De Clysteribus et Colici, 110
De Constitutione Artis Medicae, of Galen, 109
De Demonstratione, of Galen, 110
De Differentus Febrium, of Galen, 110
De Fatis Stellarum, of Albohazen, 157
De Generatione Animalium, of Aristotle, 345
De Malitia Complexionis Diversae, of Galen, 110
De Medicamentorum Compositione, of Galen, 246
De Motu Cordis, of Harvey, 209
De Sectis, of Galen, 111
De Typis Febrium, of Galen, 106
De Tribus Cordis, of Avicenna, 207
Decline and Fall of Roman Empire, of Gibbon, vi, 37n.
Dedesht, a district in Persia, 362
Delhi, 391, 415, 416
Democedes the Crotoniat, 22, 23, 24, 98
Democritus, 2, 322
Derby, Lord, 521
Descriptio Persiae, of Du Mans, 408
Diary of the East India Company, viii, 385n.
Diary of the French East India Company, viii
Dickson, Dr, afterwards Sir Joseph, 497, 498, 508, 510, 511, 513, 515, 517, 520, 524
Dinkard, The, 18
Diodorus Siculus, 28n.
Diwan-i-Islam, of al-Nasir, 171
Dogs, rules in the *Avesta* regarding, 9
Dolgorouki, Prince, 497, 499
Dominic O.C., Rev. Fr., 478
Drace, son of Hippocrates, 2
Dress of doctors, 256–60
Drummond, Mr Consul, 427
Ducastel, 191n.
abu Dulama, 271
Durand, Sir Mortimer, 524
ibn Durayd, 247
Durham, Dr, 431

East India Company, 367, 374, 375, 385, 393, 399
Ecbatana, *see* Hamadan
Edessa, 38, 48, 51
Edessa, founding the University at, 45
Edessa, School of Medicine at, 45
Edward, King of England, 370
Elizabeth, Queen of England, 356, 370
Elucidation, The, of al-Farisi, 155
Emmanuel O.C., Rev. Fr., afterwards Bishop, 368
Eross, a physician, 435
Estat de la Perse, of Du Mans, 244n., 269n., 286n., 408
Euclid, 124
Eusebius O.C., Rev. Fr., 512
Examination of Doctors, of Hunayn, 244, 269; method of, 240–6

Fables of Bidpai, 52, 117, 340
Fakhr-ul-Din al-Razi, 219, 220, 303, 304, 321, 331, 342
Faraj b. Salem, the translator, 198
abu ul-Faraj, the geographer, 222
abu ul-Faraj, the historian, *see* Bar Hebraeus
abu ul-Faraj b. ul-Tabib, 238, 260
abu ul-Faraj b. ul-Tayyib, 221
Farisi, Hasan b. Ahmad, 155
Farman Farma, brother of Fath 'Ali Shah, 458, 473
Farraguth the Jew, 206
Farrant, Colonel, 497, 499
Farrukh Khan Amin-ul-Doula, 508
Fasaha, of Hunayn, 110
Fasul-i-Buqrat, 2
Fath 'Ali Khan, a general, 426
Fath 'Ali Shah, 370, 439, 440, 442, 450, 455, 456, 457, 467, 472, 476, 478, 481, 483, 488, 491, 509
abu ul-Fath Tabrizi, 358
Fawa'id-ul-Akhya of Yusuf b. Muhammad b. Yusuf, 378
abu ul-Fayda, the geographer, 222
al-Fazal b. ul-Rabi', 87
al-Fazal b. Yahya, 81, 82, 84, 88, 235, 245
abu ul-Faza'il Muhazzib al-Naqid, 268
Fazl Ullah b. abi il-Khayr, 311
Fazl Ullah Tabrizi, physician to Tamerlane, 325
abu ul-Fazl-i-Bayhaqi, 295
Fees charged by doctors, 17–19, 267–71
Feistmantel, Dr, 532
Fi Jamal-il-Musiqi, of Rhazes, 196
Fihrist of al-Warraq, 98, 103, 104, 295
Ibn ul-Firat, 49, 133
Firdaus-ul-Hikmat, of al-Tabari, 140, 340, 372
Firdausi, a poet, 2, 28, 30, 32, 47, 187, 250, 283, 293, 316
Firidun Mirza, 475
Firuzan, a general, 61
Flower, Mr Stephen, agent, 396
Fonahn, Adolf, viin., viii, 216, 279, 347, 374, 416n.
Forbes, Dr Anthony, 408, 409
Forbes, Dr George, 424, 425, 426
Foreign Doctor, The, of Speer, 533n.
Formation of Man and his various Parts, of Mesue, 328
Fort William, *see* Calcutta
Fowler's position first described, 288
Fracastoro, describer of syphilis, 376, 377
Frampton, John, translator of *Joyfull Newes*, 370n.
Francis of Piedmont, 94
Frederick Barbarossa, 206
Frederick II of Sicily, 205
Fryer, Dr John, 243, 397–401, 407
Fullerton, Dr Isaac, 424
Funf bilderserie, 345
Furnari, a surgeon, 135

Gabrieli, a writer, 52n.
Gachet, Prof., 536
Galen, 1, 2, 89, 103, 106, 107, 109, 110, 111, 116, 125, 135, 137, 138, 181, 194, 195, 197, 198, 200, 207, 208, 214, 216, 238, 239, 246, 279, 280, 307, 326, 328, 329, 330, 332, 334, 335, 336, 343, 353, 376, 402, 407, 437, 595
Gardanne, Gen., 440, 442
Garrison, Col., viin., 345, 347, 441
Gaselee, Sir Stephen, viii
Gashtagh, a secret code, 39
Gashtagh-daftaran, 39
Gauhar Shad, wife of Shah Rukh, 348
Gazophylacium Linguae Persarum, of Fr. Angelus, 367
General Medical Council, 365
Genta Shapurta, *see* Jundi Shapur
George III, King of England, 445
Georges, Dr., 532, 536
Gerald, Mr, apothecary, 485
Gerard of Cremona, 110, 113, 201, 206
Geschichte der Arabischen Aerzte, of Wustenfeld, viin.
al-Ghafiqi of Cordova, 100
Ibn Ghalib, a writer, 206

Abu-Ghalib, a druggist, 190
al-Ghazali Hujjat-ul-Islam, 219, 352, 407
Ghazan, son of Arghun, 310, 311
Ghiyas-ul-Din 'Ali, son of Kamal-ul-Din, 358
Ghiyas-ul-Din, son of Muhammad Sabzawari, 11n., 15, 290, 333, 338, 343, 355, 356, 362, 363
Ghiyas-ul-Din Muhammad, son of Rashid-ul-Din, 316
Ghiyas-ul-Din Shirazi, an astrologer, 306, 379
Ghiyasia, of Mansur b. Faqih Ilyas, 347
Gibbon, an historian, vi, 37, 42, 44, 118
Gilan, 390, 437, 462
Gladwin, Francis, 373
Glen, Dr William, 533
Goa, 397, 398
Golitzin, Prince, 417
Gombroon, *see* Bandar Abbas
Gotze, a writer, 21n.
Grabadin Medicinarum Particularium, of Mesue Junior, 93
Grain, *see also* Koweit, 432
Grands Philosophes: Avicenne, of de Vaux, 194
Granicus, battle of, 28
Graves, Mr Danvers, 420, 424
Grebaiodoff, Prince, 453
Griffith, Dr, 469, 472, 473
Griselle, Dr, 503
Gruner, Dr O. C., 196
Guide, The, of Rhazes, 239
Guigues, Dr P., 201
Gulistan of Shaykh Sa'di, 54n., 65, 66, 266n., 376n.
Gull, Sir William, 590
Gundisalvi, a translator, 113, 207

Habib Adle, Dr, 554
Hack, Dr, 520
al-Hadi, 4th 'Abbasid Caliph, formerly called al-Musa, 77, 78, 81, 120, 255
Haddud-ul-Tibb, of Avicenna, 194
Hafiz, a poet, 249, 364
al-Hajjaj, 67, 68
al-Hajjaj b. Matar, 104
al-Hajjaj b. Yusuf, 341
Hajji Baba Ispahani, of Morier, 441, 442
Hajji Khalifa, 2, 63, 140, 198, 223, 278, 294, 332n., 353
Hajji Mirza Aqasi, 473, 477, 487, 494, 495, 496, 498, 500
Hakim b. Hunayn, 116
Hakim-ul-Doula, 547, 551, 552, 555, 557, 562, 564
Hakim Husayn Shirazi, 358
Hakim Khayri, 359, 360
Hakim-ul-Mulk, 424
Hakim-ul-Mumalik, *see* Shuharat
Hakim Sharaf, 360
Hall, Major, 572
Haly Abbas (that is, 'Ali ibn ul-'Abbas), 99, 153, 155–8, 163, 199, 201, 236, 239, 293, 329, 330, 336, 338, 340, 370, 390, 536
Hamadan (formerly Ecbatana), 43, 44, 61, 189, 191, 304, 542
Hammad b. abi Sulayman, 260
Hammurabi, Code of, 5, 16
Hamza Mirza, son of 'Abbas II, 386
Hamza Mirza, son of Muhammad Khudabanda, 383
abu Hanifa, 72, 299
Hanmer, Dr, 425
al-Haravi, Muhammad b. Yusuf, a writer, 168
Hardcastle, Dr John, 424
Haris b. Kalda, 66, 67, 68, 127
Harisima, a sub-executioner, 83
Hart, Major, 469
Harun al-Qass (or Ahrun the Priest), 99, 100
Harun-ul-Rashid, 5th 'Abbasid Caliph, 71, 76–85, 88, 89, 95, 96, 97, 117, 120, 132, 160, 205, 255, 256, 257, 262, 268, 270, 311, 348
Harvey, Sir William, 184, 209, 280, 437, 594
al-Hasan, physician to al-Muqtadir, 237
abu Hasan, a translator, 101
Hasan 'Ali Mirza, 473
Hasan Buwayh, *see* Rukn-ul-Doula
Hasan Buzurg, Shaykh, 324
abu ul-Hasan Hilal b. ul-Muhassin, 134
abu ul-Hasan Khan, a diplomat, 443, 488
abu ul-Hasan Khan, a writer, 502
abu ul-Hasan Koshyar, 185
Hasan b. Mukhallid, a *wazir*, 270
Hasan b. Musa, 102
Hasan-Sabbah, the Assassin, 212
abu ul-Hasan Sabit, physician to 'Azud-ul-Doula, 150, 151
abu ul-Hasan Sabit b. Qurra, *see* Sabit I
Hasan b. Sahl, a *wazir*, 85
al-Hashimiyya, a palace, 69, 70
Ibn Hauqal, a writer, 49
Havard, Mr, afterwards Sir Godfrey, 570, 571, 572
Haworth, Col. Sir Lionel, 577
Hayat-ul-Hayawan, 323
Haydar Mirza, son of Shah Tahmasp, 358, 359, 382, 383
Ibn ul-Haysam, *see* Alhazen

Henry III of Castile, 325
Hephaestion, 29
Heraclius, 56
Herat, 304, 353, 372, 378, 462, 464, 465, 467, 473, 474, 477, 482, 483, 485, 488
Herbert, Sir Thomas, 173, 292n., 317, 396, 398, 406n.
Hermet, Mr Joseph, linguist, 418, 422
Herodotus, 21, 24n., 280
Herriot, Dr Robert, 412, 413, 424
Hibat Ullah b. 'Ali Ispahani, a Moslem, 169
Hibat Ullah Amin-ul-Doula, a Christian, *see* Ibn Tilmiz
Hibat Ullah b. Mulka, a Jew, *see* Abu ul-Barkat
Ibn Hibat Ullah, Sa'id, 164, 223
Hidaya, of Abu Bakr Ajwini, 239
Hifaz-ul-Sahhat, of Fakhr-ul-Din, 219
Hilal b. Ibrahim b. Zahrun, 150
Hine, Dr, 442
Hippocrates, 1, 2, 19, 116, 194, 195, 198, 209, 278, 280, 307, 330, 353, 403, 404, 407
Hirschberg, a writer, 140, 143, 286
Histoire des Bimaristans, of Ahmed Issa, 243
Histoire de la Medicine Arabe, of Leclerc, vii, 62n., 94, 101n., 109n., 116, 184n., 206, 369, 374n.
History of Arabian Literature, of Nicholson, 262n.
History of Dentistry, of Lindsay, 287n.
History of the Dynasties, of Bar Hebraeus, vin., 1n., 47n., 75n., 78n., 90n., 93n., 99n., 105n., 106n., 128n., 143n., 150n., 151n., 154n., 155n., 165n., 168n., 184n., 219n., 221n., 227n., 263n., 285n., 306, 307, 360n.; *see also* Bar Hebraeus
History of Medicine in Persia, of Elgood, 347
History of the Missions, of Fr. Eusebius O.C., 512
History of the pharmacy of stones, 369
Hoernle, Rev. Dr E. F., 534
Holmyard, Prof. E. J., 284
Holstein, Duke of, 400
Hooper, Robert, an anatomist, 375
Hormisdas I, 47
Hormisdas II, wife of, 41
Hormisdas II, son of, 41
Hormisdas IV, 53, 55
Hormuz, battle of, 37
Hormuz, son of Nurshirwan, *see* Hormisdas IV
Hormuzan, 60
Hoshang Shah, 158
Hospitals:
  administration of, 182
  ambulant, 174, 175, 176
  and their dispensary, 181, 182
  at Arbela, 172
  al-'Azudi, 71, 159–66, 169–72, 177, 178
  at Biriz, 173
  at Cairo, 177
  at Damascus, 306
  at Hamadan, 312
  at Hormuz, 512
  at Ispahan, 398, 534, 535
  at Jurjan, 173
  at Marrakesh, 176
  al-Mustansiriyya, 232
  at Samarqand, 173
  at Shiraz, 172, 308, 312
  at Tabriz, 173, 312, 398
  al-Tutushi, 212
  at Urumia, 533
  for the Insane, 179, 180, 181
  founding of, in Baghdad, 70, 71, 132; *see also* Old and New H.; in Teheran, 511, 512; *see also* Imperial H.
  Marizkhana-i-Daulati ('Imperial H.'), 512, 545–58
  'The New', *see* al-'Azudi H.
  'The Old', 70, 71
  See also Bimaristan and Jundi Shapur
Hubaysh al-A'sam, 104, 107, 110, 111, 112, 116, 118, 139, 246
Hulagu, Mongol Il-Khan, 171, 232, 233, 302, 305, 306, 307
Humayun, emperor of Delhi, 373, 378
Hunain ibn Ishak und seine Schule, of Bergstrasse, 110
Hunayn b. Ishaq ('Johannitius'), 2, 86, 89, 100, 104–13, 116–20, 124, 136, 139, 140, 141, 206, 227, 235, 239, 244, 269, 307, 364, 407
Hundred Chapters, of Abu Sahl, 185, 216, 239
Husayn Mirza, later Shah Sultan Husayn, 389, 390
Husayn 'Ali, son of Fath 'Ali Shah, 458
Hyde, Dr, of Queen's College, Oxford, 367

Ibrahim, a physician, 75, 76
Ibrahim, grandson of Shaykh Junayd, 350
Hajji Ibrahim, a *wazir*, 438
Ibrahim b. Ayub, 119
Ibrahim b. Hilal, a writer, 250
Ibrahim b. Sabit, 127
Ibrahim b. Salah, 95, 96
Ibrahim b. Sinan, 127, 134, 241, 269
Ibn ul-'Ibri, *see* Bar Hebraeus

al-Ibrish, a physician, 119
Ignis Persicus, a disease, 376
Ikhtiyarat-i-Badi'i, of al-Ansari, 50, 364, 369
Ikhwan-ul-Safa' ('Brethren of Purity'), 340
Iksir-i-A'zam, 381n.
'Ilaj-ul-Amraz of Yusuf b. Muhammad, 378
Ilberg, Dr, 532, 546
'Ilm-ul-Bah, 294, 295, 296
'Ilm-ul-Hikmat-i-'Ayn, of Muhammad b. Muhammad al-'Arab, 143
Ilyas, Mansur b. Muhammad, 332–6, 338, 339, 342–5, 347
Ibn Ilyas Shirazi, 312
'Imad-ul-Din Ispahani, the Katib, 165
'Imad-ul-Din Mahmud Shirazi, 245, 276, 348, 356, 364, 365, 371, 379, 380, 381, 382
'Imad-ul-Doula, 'Ali the Buwayhid, 144, 145, 152
Imam Riza, 348, 382
Imru'u ul-Qays, a poet, 63
India, 187, 369, 372, 373
Introduction to the History of Medicine, of Garrison, viin.
al-Iqna', of Sa'id b. Hibat Ullah, 164
L'Iran sous les Sassanides, of Christensen, vin., 39n.
'Isa b. 'Ali, uncle of al-Mansur Caliph, 101
'Isa b. Asyad, pupil to Sabit, 127
abu 'Isa Baqia, a physician, 161
'Isa b. Ibrahim, a convert, 90
'Isa b. Masawayh, a melancholic, 88, 156
'Isa b. Sahlasa, physician to al-Mansur, 75, 76
'Isa b. Tahirbakht, physician, 76
'Isa b. Yusuf ibn ul-'Attar, a physician, 146
Isagoge, of Johannitius, 111
abu Ishaq At'ima, a writer, 295
Ishaq b. Hunayn, a translator, 115, 139, 200
abu Ishaq, brother to al-Ma'mun, 117
Ishaq b. Shalita, pupil to Sabit, 134
Ishaq b. Sinan, 134
Isma'il, Khwaja Adib, a physician, 250
Isma'il b. ul-Mutawakkil Caliph, 119
Isma'il Shah, a pretender, 414
Isma'il Shah, grandson of Shaykh Junayd, 290, 306, 350, 351, 352, 356, 373, 379
Isma'il Shah, son of Shah Tahmasp, 382, 383
Isma'il, the Sufi, 185
Ispahan, 61, 145, 163, 189, 190, 243, 244, 269, 333, 350, 351, 355, 356, 366, 382, 384, 386, 387, 389, 390, 393, 394, 396, 396, 398, 399, 400, 401, 403, 408, 414, 417, 418, 419, 422, 423, 424, 426, 438, 450, 458, 463, 469, 470, 473, 479, 488, 497, 534, 541, 544, 545
Isra'il b. Zakariyya al-Tayfuri, 108, 120, 121, 122, 270
Istajlu, 'Abd-Ullah Khan, 349, 382
I'tizad-ul-Doula, a general, 515
I'tizad-ul-Sultana, 'Ali Quli Mirza, 502, 509
I'tizad-ul-Sultana, Prince, 519
Ives, Edward, surgeon, 362n., 427, 428
al-Izah fi Asrar-il-Nikah, of Ibn Nasr Shirazi, 296
'Izz-ul-Doula, formerly Bakhtiyar, 153, 154

Ibn Jabayr, Sayyid, 67
Jackson, Prof., 11
Abu Ja'far the Barmecide, 69, 79, 82, 83, 102, 230
Ja'far Tabrizi, a printer, 479
Jahangir, son of Tamerlane, 325
al-Jahiz, shaykh, of Basra, 321
Jalal-ul-Din Dawani of Shiraz, 351
Jalal-ul-Din al-Rumi, *see* al-Rumi
Jalal-ul-Din Malik Dinar, 378
Jalal-ul-Doula, son of Nasr-ul-Din Shah, 515
Jamal-ul-Din Ispahani, a physician, 315, 363
James I, King of England, 393
Jami, 'Abd-ul-Rahman, a poet, 352
Jami'-ul-Fawa'id, of Yusuf b. Muhammad, 378
Jami'-ul-Hikayat, of Nur-ul-Din 'Aufi, 322
Jami'-ul-Kabir, of al-Razi, 220
Jami'-ul-Tawarikh, of Rashid-ul-Din, 313
Jami'-ul-'Ulum, of al-Razi, 321
Jamshid, king of Persia, 2, 3
Janus Damascenus, *see* Mesue Senior
al-Jarish, a physician, 328
Ibn ul-Jarrah, 'Ali b. 'Isa, 131, 175
Jask, 393, 576
Jaubert, M., 440
Jawami' Kitab-i-Jalinus, 138
Jawidan-i-Khird, of Hoshang Shah, 158
Ibn Jazla, Abu ul-Hasan Yahya, 206, 222, 223, 263
Jefferis, Mr Robert, 394
Jenkins, Anthony, 356
Jesu Haly, *see* 'Ali b. 'Isa, the oculist
Jesuits, the, 533; *see also* Br. Bazin S.J.
Jibra'il b. Bukht Yishu' (Jibra'il I), 79, 80, 82, 83, 85–9, 92, 95, 106, 107, 127, 130, 245, 248, 257, 258, 268, 269
Jibra'il, the Durustpat, 54, 55
Jibra'il, the ophthalmologist, 267, 285
Jibra'il b. 'Ubayd-Ullah (Jibra'il II), 133, 161, 162
Johannitius Onan, *see* Hunayn
Johnston, Sir Frederick, 577

Jones, Mr, afterwards Sir Harford, 432–6, 440, 442, 443, 445, 487
Joseph, bishop of Seleucia, 55
Jovian, emperor of Rome, 44, 45
Joyfull Newes, of Monardes, 370n.
Judaeus, *see* Masarjoyah
Jukes, Dr Andrew, 443–8
Julfa, 423, 426, 448, 450
Julian the Apostate, 42, 43, 44
Ibn Juljul, a writer, 198
Junayd, Shaykh, 349
Jundi Shapur, 33, 46, 47, 49, 50, 51, 54, 61, 66, 68, 75–80, 86, 88, 92, 98, 102, 103, 105, 106, 107, 118, 167, 173, 174, 235, 249, 264, 326
al-Jurjani, Sayyid Isma'il Zayn-ul-Din, 31, 50, 75, 99, 173, 180, 182, 193, 214–19, 239, 240, 259, 267, 288, 289, 294, 331, 332, 337, 342, 353, 354, 356, 373
Jurjis b. Bukht Yishu', 68, 75–7, 80, 86, 104, 105, 107, 250, 255, 360
Justinian, emperor of Rome, 49, 50, 63
Juzjani, abu 'Ubayd, 188, 189, 190, 192

Kaempfer, Dr Engelbert, 407, 408
al-Kafi, of Jibra'il b. 'Ubayd-Ullah, 133, 214
Kai Kubad, King of Persia, 46, 50
Ibn Kakuya, 'Ala'-ul-Doula, 190
Kale, Dr, 496
Kalila wa Dimna, see *Fables of Bidpai*
Kama Sutra, 296
Kamal-ul-Din, an ophthalmologist, 137
Kamal-ul-Din al-Damiri, a zoologist, 323
Kamal-ul-Din, Husayn Shirazi, a physician, 358
Kamal-ul-Din al-Kazaruni, a physician, 308
Kamal-ul-Din, Shaykh-ul-Islam, a physician, 307
Kamil-ul-Sana'at, of al-Majusi, *see Liber Regius*
Kandahar, 385, 391
Kanz-ul-Hidaya, of al-Rudbari, 321
Karim Khan-i-Zand, 392, 426, 427, 429–31, 437
Karkh, a quarter of Baghdad, 70, 71
Ibn Karnib, a writer, 125
Karrack, 428, 486, 488, 489, 490, 493
Kashaf-ul-Zanun, of Hajji Khalifa, 2n., 278n., 295n., 332n.; *see also* Hajji Khalifa
Kashan, 34, 385, 387, 390, 462
Ibn Kashkaraya, 128, 161, 163
al-Kashmiri, a writer, 192
al-Kayshi, Muhammad b. Ahmad, 308
Kelly, I. M. S., Capt., 529
Kepler, 141
Keppel, Capt. the Hon. George, 392n.
Keradj, a village, 541
Kerman ('Carmenia'), 62, 390, 392, 420, 423, 424, 426, 458, 490
Kermanshah, 462, 514, 531, 540
Kerr, Capt., 425
Khabur, a river, 42
Khalaf-ul-Zahrawi, a surgeon, 278
Khalid, an Arab general, 58, 59
Khalid, the Barmecide, 80, 81
Khalid b. Yazid, 98, 99
Khalil, son of Uzun Hasan, 350
Khalil Shafaghi Alam-ul-Doula, Dr, 564
Khalil Sultan, son of Tamerlane, 325, 348
Ibn Khallikan, 49n., 66n., 68, 80n., 81n., 85n., 106n., 124n., 132n., 134n., 147n., 154n., 161n., 165n., 168n., 169n. 173n., 184n., 192, 211n., 224, 238n., 239n., 256n., 258n., 259n., 272n., 291, 293n., 307, 322n., 341n.
Khamartagin, a benefactor, 212
Ibn ul-Khammar, a physician and writer, 162, 240
Khan Ahmad of Gilan, 358
al-Khaqani, 133
abu ul-Khayr, a surgeon, 161, 162
al-Khayzuran, a slave girl, 77, 120, 255
Khirqa-i-Khanum dar 'Ilm-i-Tibb, of Quli Khan Shamlu, 283, 297
Khiva, 240, 391
Khorasan, 371, 392, 466, 498
Khosru Parviz, *see* Chosroes II
Khuff-i-'Ala' i, of al-Jurjani, 259
Khulasat-ul-Tujarib, of Baha'-ul-Doula, 180n., 266n., 278, 283, 353, 354, 365, 381
Kifaya, of Ahmad b. Faraj, 239
Kifaya-i-Mujahidiyya (also called *Kifaya-i-Mansuri*), of Mansur b. Faqih Ilyas, 347, 367
al-Kindi, 105, 258
Kisham, an island, 446, 447, 448
Kisra, *see* Nurshirwan
Kitab fi Abdal-il-Adviya, of Masarjoyah, 100
Kitab-ul-Abniya 'an Haqa'iq-il-Adviya, of Abu Mansur Muwaffaq, 363
Kitab-i-Adab-ul-'Arab wa al-Fars, of Ibn Miskawayhi, 158
Kitab-i-Furusiyya, of Muhammad b. Ya'qub, 320
Kitab-ul-Ghani wa ul-Mani, of Abu Mansur al-Qamari, 185
Kitab-ul-Hawi fi il-Tibb, of Rhazes, 199

Kitab 'Ilal-ul-'Ilal, of Abu Mansur al-Qamari, 185
Kitab dar 'Ilm-i-Tashrih, of al-Jurjani, 332
Kitab-ul-Iqtizab, of al-Masihi, 229
Kitab-ul-Iqtizab, of Abu Nasr, 229
Kitab ul-Khalq-il-Insan, of al-Asma'i, 329
Kitab-ul-Khayl, of Muhammad b. Ya'qub, 320
Kitab-ul-Mabda' wa ul-Ma'ad, of Avicenna, 194
Kitab al-Mansuri, of Rhazes; see *Liver Nonus ad Almansorem* and *Liber ad Almansorem*
Kitab al-Masa'il fi il-'Ayn, of Hunayn, 139
Kitab-ul-Mufid, of al-Maghribi, 296
Kitab-ul-Muntakhib fi 'Ilaj-il-'Ayn, of Ammar b. 'Ali, 142
Kitab-ul-Muwashsha, 259n.
Kitab-Shafi fi Tibb, of Ibn ul-Quff, 309
Kitab-ul-Taharat, of Ibn Miskawayhi, 158
Kitab-i-Tajarib-ul-Umam wa Ta'aqib-ul-Himam, of Ibn Miskawayhi, 157
Kitab-ul-Tasrif, of Abu ul-Qasim al-Zahrawi, 278
Kizlarun Ili, or 'Year of the Girls', 390
de Koning, Dr P., 326
Koshyar, a teacher of Avicenna, 236
Koweit, formerly called Grain, 432
Kraus, Dr Paul, 169n.
Kremer, a writer, 94n.
Krusinski S.J., Rev. Fr., 389
Kuchik Khan, a bandit, 543
Kufa, a city, 61
Kuzmingi, Dr, 520

Labat, Dr, 495
Labid b. Rabi'a, a poet, 63
Labrosse, Joseph, *see* Fr. Angelus O.C.
Lar, a village, 399, 407, 429
Lata'if-ul-Rashidiyya, of Ibn Ilyas, 312
Lata'if-ul-Tawaif, 272
Lattes, Dr, 536
Lawrence, Col. T. E., viii
Le Blanc, Dr, 536
Leclerc, viin., viii, 62n., 94, 101n., 109, 110, 112, 116, 184n., 206, 279, 369, 374n.
Le Strange, Guy, 71n., 316
Lemgo, a city, 407
Leo the African, 93, 94
Leo the Armenian, emperor of Rome, 103, 104
Leonardo da Vinci, 209
Lessan Chams, Dr, viii, 548
Lesser Canon, The, of Ibn Manduya, 163
Lesser Pharmacopoeia, The, of Sabur, 92
Liber ad Almansorem, of Rhazes, 201, 206, 239, 251n., 278, 370
Liber Nonus ad Almansorem, 201, 204, 206, 208, *and see above*
Liber Regius, of Haly Abbas, 100, 140, 155, 156, 157, 195, 201n., 216, 236n., 239, 278, 279, 326, 329, 330, 334, 340, 370
Lichwardt, Dr, 378
Lindsay, a writer, 287n.
Lingah, a port, 576
Lippert, 140
Lissan-ul-Hukama, Shahzada, viii, 548
Listemann, Dr, 530, 531, 546
Literary History of Persia, of Browne, 40n., 193, 455n.
Lockhart, Dr, viii, 419
London, 435, 441, 445
Loqman-ul-Mamalik, Dr, 531
Loqman-ul-Mulk, Dr Sayed Khan, 577, 582
Loraine, Sir Percy, 554, 556, 557
Lucknow, 391
Lutf 'Ali Khan, later Shah, 392, 426, 437, 438, 457

Ma'alim al-Qurba, of Ibn ul-Ukhuwwa, 244n., 266n., 275n., 299n., 317
Macdonald, Colonel, afterwards Sir John, 449, 450, 451, 453, 459, 461, 494
Macgregor, Major, 511, 512
Macnaghten, editor of *Arabian Nights*, 374
Madrasa Nizamiyya, La, of Asad Talas, 212n.
Maghil, a village, 435
al-Maghribi, abu ul-Hakam al-Bahali, 174
Maghribi, Samu'l b. Yahya, 295, 296
Magrath, Dr, 449, 450
Mahan b. Kakuy, 144
al-Mahdi, 3rd 'Abbasid Caliph, 76, 81, 120, 255, 271
Ibn Mahdi, a physician, 312
Abu Mahir b. Sayyar al-Shirazi, 156, 163
Mahmud, brother of Avicenna, 184
Mahmud, the geometrician, 185
Mahmud Ghaznavi, 158, 162, 187, 188, 210, 348
Mahmud, grandson of Malikshah, 169
Mahmud b. Ilyas Shirazi, *see* Ibn Ilyas
Mainwaring, Dr Richard, 429
Maitland, Sir Frederick, 486
Abu Majd b. ul-Bahali, *see* al-Bahali
Majd-ul-Din al-Bukhari, 218
Majd-ul-Doula Daylami, 189
Majma'-ul-Jawami', of Muhammad Husayn al-Khorasani, 416
al-Majusi, *see* Haly Abbas

Ibn Makla, the Jew, 167
Malcolm, Capt. afterwards Sir John, 251n., 439, 441–4, 446, 447, 450, 461, 479
Malik 'Ala'-ul-Din, 313
Malik b. Anas, 72, 299
Malik-ul-Atibba, a physician, *see* Baba Shirazi
Malik ul-Mujahid, 'Ali, 321
Malik Rahim, the Buwayhid, 210, 211
al-Maliki, see *Liber Regius*
Malikshah, the Seljuq, 224
Mallock, Dr, 273
al-Ma'mun, 7th 'Abbasid Caliph, 76, 78, 82, 85, 86, 88, 89, 96, 97, 98, 101, 103, 104, 112, 116, 117, 153, 160, 231, 257, 267, 284, 348, 364
Ma'mun b. Muhammad Khwarazmshah, 185
Manafi'-ul-A'za', of Galen, 214
Manafi'-ul-Hayawan, of 'Ubayd-Ullah b. Jibra'il, 323
Ibn Manduya abu 'Ali, 161, 163, 193
Maneckji Dhalla, vin., 13
Manesty, Mr, the agent, 432, 434, 435
Mangu the Khaqan, 302
Mani (or Manes), 47
Manka (or Mikna), 101, 372
du Mans O.F.M. (Cap.), Rev. Fr. Raphael, 244, 269, 286, 398, 408, 479
al-Mansur, 2nd 'Abbasid Caliph, 68–72, 75, 76, 81, 101, 105, 160, 250, 251n., 327, 360
abu Mansur Bakhtiyar, *see* 'Izz-ul-Doula
Mansur b. Faqih Ilyas, 332–6, 338, 339, 342–5, 347
Mansur b. Ishaq, 201
abu Mansur Muwaffaq, 291, 363
Mansur b. Nuh I, *amir* of Bukhara, 267
Mansur b. Nuh II, *amir* of Bukhara, 363
abu Mansur al-Qamari, 185
Marco Polo, 34
Marcus, emperor of Rome, 43
Mardavij b. Ziyar, 144, 148, 288
Marinus, an anatomist, 326
Ibn ul-Maristani, 171, 361
Martin, Dr, 590
Martingo, Dr, 480
Martyn, Rev. Henry, 533
Ma'ruf Karkhi, 161
Marvels of Creation, of al-Marvi, 323; of al-Qazvini, 65, 322
Marwan II, Caliph of Damascus, 69–72, 98, 99
Marzuban b. abu Mansur Bakhtiyar, 154
al-Marzubani, abu Ahmad of Ispahan, 163
Masa'il fi ul-Tibb, of Hunayn, 2, 111, 239, 269
Masarjoyah (also written Masarjuwaih), 99, 100, 101
Masawayh, a pharmacist, 87, 88, 89, 249, 267, 268
Masawayh al-Marindi, *see* Mesue Junior
Abu Ma'shar al-Balkhi, a physician, 258, 407
al-Masihi, abu ul-Khayr, 228, 229, 303
Masihi, abu ul-Husayn, 229
Masihi abu Sahl 'Isa, 185, 187
Masnavi of Jala-ul-Din al-Rumi, 249n., 275n., 282n.
Masrur, an executioner, 81, 83, 84
Mas'ud, a prince, 295
Mas'ud Aurraq, 186
Mas'ud, Mirza, Minister for Foreign Affairs, 477, 478, 488
Mas'udi, 62
Matrah-ul-Anzar, of Zeylessouf al-Douleh, 125, 134n., 162, 163, 269n., 360n.
Matthew O.C., Rev. Fr., 366, 368
Maurice, emperor of Rome, 55
May, Mr, 408
Maymun b. Qays, 63
Mazanderan, 390, 437
Mazdak, 51
McNeill, Dr, afterwards Sir John, 446, 450–3, 455, 457, 459, 460, 461, 463, 464, 465, 472, 474, 476, 477, 480–7, 490–4
Meade, Col., 524
Mecca, 56, 62, 69, 85, 132, 210, 416
Medem, Count, a Russian Minister, 496
Medina, 60, 61, 69, 81, 369
Mellick, Petrus, 430
Memoirs, of Fr. Krusinski S.J., 389n.
Memorandum Book of a Tenth-Century Oculist, of Casey Wood, 286
Menichikoff, Prince, 451, 452
Meragha, 295, 305, 306, 323, 379, 451, 456
Merdasas, 56
Merv, 352, 372, 373
Meshed, 357, 387, 420, 438, 464, 465, 467, 474, 482, 489, 511, 528
Mesnard, Dr, 563, 577
Mesue Junior (Masawayh al-Marindi), 93, 94, 95, 206, 284, 287
Mesue Senior (Yuhanna b. Masawayh), 87, 89–92, 94, 95, 101, 106, 138, 298, 327–30, 363
Meyerhof, Dr Max, vii, viii, 100, 112, 138, 139n., 169n., 197, 199, 222n., 254, 345
Michael Scot, 206
Miftah-ul-Khaza'in, of al-Ansari, 364
Mika'il b. Jibra'il, 85–8
Mikna (or Manka), 101, 372

Millingen, Dr, 520
Millspaugh, Dr, 561
Milne, Dr John, 432, 433, 434
Minhaj-ul-Bayan fi ma yast'amalahu ul-Insan, of Ibn Jazla, 223
Minto, Lord, 443
Mir Muhammad b. Karam 'Ali, a translator, 201
Mir Muhammad Zaman Tankabuni, 368
Mir Qawam-ul-Din, 353
Mirat-ul-Sahhat, of Ghiyas-ul-Din, 1n., 15n., 333, 356
Mirkhwand, a writer, 352
Mirza Muhammad, 188
Ibn Miskawayhi, abu 'Ali Ahmad, 157, 158, 193
Missions, association with medicine: Catholic, 367, 368; Protestant, 533–5
Mizan-ul-Tibb, of Akbar Shah Arzani, 374
Moadebod Dowleh, Dr, 652
Mohammerah, a port, 442, 443, 576, 580, 581, 582
Monardes, Nicholas, 370
Morier, James, 441n., 442, 443
Moses, 35
Mosul, 70, 77, 81, 352, 432, 434, 436
al-Mosuli, abu Ishaq Ibrahim, 256
Moussa Khan, Dr, 548
Ibn ul-Mu'ammul abu ul-Hasan, 229
al-Mughni, of Sa'id b. Hibat Ullah, 164
Muhallabi, a *wazir*, 153
Muhammad the bed-maker, 384
Muhammad the Prophet, 6, 32, 56, 58, 62–6, 68, 69
Muhammad 'bin Abd-ul-Andalusi', 120n.
Muhammad b. 'Abd-ul-Malik al-Zayyat, 103
Muhammad b. 'Ala'-ul-Din of Sabzawar, 355
Muhammad Akbar Arzani, 63, 304, 374
Muhammad 'Ali Khan, a minister, 497
Muhammad 'Ali Mirza, son of Fath 'Ali Shah, 457
Muhammad Bakr, an oculist, 382
Muhammad b. Daniyal, 265
Muhammad Hasan Khan Qajar, 392, 415, 416, 423, 426, 437
Muhammad Isma'il, *see* Akbarabadi
Muhammad al-Mahdi al-Hafnavi, 266
Muhammad abu Muhammad of Shiraz, 194
Muhammad b. Muhammad al-'Arab, 143
Muhammad Mu'man Husayni, *see* Tabib Mu'mana
Muhammad b. Musa, 102, 123
Muhammad b. ul-Mu'tazid, *see* Qahir Caliph
Muhammad b. ul-Qasim, 146
Muhammad Qasim b. Sharif Khan, 321
Muhammad Qibli, an *hakimbashi*, 505
Muhammad Reza, *see* de Vercheville
Muhammad Shah, emperor of Delhi, 374, 416
Muhammad Shah, son of 'Abbas Mirza, 465, 467–73, 478, 480, 481
Muhammad Taqqi Mirza, 458, 459
Muhtasib, or Inspector-General, 244, 247, 248, 249, 274–8, 299
Mu'in-ul-Din, son of Nasr-ul-Din Shah, 506, 507
Mu'in-ul-Din, a physician, 364
Muir, 210n., 228
Mu'izz-ul-Din Muhammad Ispahani, a *wazir*, 348, 357
Mu'izz-ul-Doula, formerly Ahmad b. Buwayh, 152, 153
Mujahid-ul-Din, a patron, 347
Mu'jam-ul-Buldan, of Yaqut, 39n., 201, 212n.
Mujiz-i-Kummi, 259
Mujiz-ul-Qanun, of Ibn Nafis, 309, 335, 375
Mukhtasar-ul-Duwwal, see *Historia Dynastarum* and Bar Hebraeus
Mukhtasar-i-Khuff-i-'Ala'i, of al-Jurjani, 218
al-Muktafi, 17th 'Abbasid Caliph, 128
Mundinus of Bologna, 208
Mu'nis the Eunuch, 129, 130, 131, 146
al-Muntasir, 11th 'Abbasid Caliph, 121
Muqaddasi, a writer, 160
Ibn ul-Muqaffa, 52, 101
Ibn ul-Muqla, 130, 146, 147
al-Muqtadi, 27th 'Abbasid Caliph, 164, 223, 224, 277
al-Muqtadir, 18th 'Abbasid Caliph, 128, 129, 130, 237, 240
al-Muqtafi, 31st 'Abbasid Caliph, 165, 166, 226
al-Murakhkhim, physician and judge, 174
Musa b. Shakir, astronomer and patron, 101
Bani Musa, patrons, 102
Musa b. al-Mahdi Caliph, *see* al-Hadi Caliph
Muscat, 439, 447
Mushir-ul-Doula, ambassador, 510
Mushir-ul-Doula, prime minister, 549, 551
Mustafa Quli, brother to Agha Muhammad Shah, 438
al-Musta'in, 12th 'Abbasid Caliph, 258
al-Mustakfi, 22nd 'Abbasid Caliph, 150, 151, 152
al-Mustanjid, 32nd 'Abbasid Caliph, 165, 226
al-Mustansir, 36th 'Abbasid Caliph, 171, 230, 231, 232
al-Mustarshid, 29th 'Abbasid Caliph, 225

al-Musta'sim, 37th 'Abbasid Caliph, 233, 305
Mustaufi, 'Aziz-ul-Din, benefactor, 172, 175
Mustaufi al-Qazvini, writer, *see* al-Qazvini
al-Mustazhir, 28th 'Abbasid Caliph, 164, 224, 225
al-Mustazi, 33rd 'Abbasid Caliph, 227
al-Mu'tabar, of Abu ul-Barkat, 168
Mutabiqat bayn Qol-il-Inbiya wa il-Falasifat, of Bukht Yishu', ii, 159
al-Mu'tamid, 15th 'Abbasid Caliph, 109, 122, 270
Mu'tamid-ul-Doula, a Regent, 513
al-Mu'tasim, 8th 'Abbasid Caliph, 91, 107, 117, 118, 257, 328
al-Mutawakkil, 10th 'Abbasid Caliph, 89, 107, 108, 116, 118–22, 130, 270
al-Mu'tazid, 16th 'Abbasid Caliph, 74, 115, 122, 123, 124, 127, 128, 133, 231, 241
al-Mu'tazz, 13th 'Abbasid Caliph, 121, 122
al-Muti', 23rd 'Abbasid Caliph, 210
al-Muttaqi, 21st 'Abbasid Caliph, 149, 152, 158
al-Muwaffaq, father of al-Mu'tazid Caliph, 123
Muwaffaq-ul-Din Samarri, a writer, 309
Muzaffar-ul-Din Shah, 538, 539, 546

Naban, a village, 425
al-Nabigha of Zubyan, a poet, 63
Nadir Shah, viii, 273, 368, 374, 390, 391, 413–17, 419, 420, 423, 424, 437, 438, 533
Naficy, Dr Abbas, 218
Nafis b. 'Iwaz of Kerman, 156, 304, 336
Ibn Nafis, 309, 327, 333, 335, 336, 375
Nafsa, Shaykh, of Karrack, 490
Nafzawi, Shaykh, 296, 297
Najam-ul-Din Qazvini, an ophthalmologist, 143
Najib-ul-Din Samarqandi, a writer, 304, 336
Nakhchivan, a town, 452
Naples, 395
Napoleon I, emperor of France, 370, 439, 440, 441, 448
Ibn ul-Naqah, a surgeon, 161, 162
al-Nasir, 34th 'Abbasid Caliph, 227, 229, 230, 290
Nasir-ul-Din Shah, 457, 481, 494, 498, 500, 504, 518, 521
Nasir-ul-Doula, governor of Damascus, 213
Nasir-ul-Mulk, a Regent, 539
Abu Nasr, physician to al-Nasir Caliph, 228, 229
Abu Nasr b. ul-Duhali, 161
Abu Nasr Gilani, physician to Haydar Mirza, 358, 359
Abu Nasr-i-'Arraq, a physician and artist, 188
Abu-Nasr-ul-Din Tusi al-Muhaqqiq, 158, 305, 306, 379
al-Natali, a physician and logician, 185
Nathan the Jew, 142
al-Nazar, cousin of Muhammad the Prophet, 68
al-Nazar 'Ali, an *hakimbashi*, 488
Nazif al-Rumi, a physician and priest, 155, 161
Nazim-ul-Atibba, a doctor, 562
Nazuk, a general, 129, 130
Neligan, Dr A. R., 532, 546, 547, 548, 554, 555, 557, 567, 577
Nestorius, Patriarch of Constantinople, 46, 55
Neuburger, 94n., 202
New Account, of Fryer, 243
New Testament, tr. into Persian by Walton, 367
Nicholson, Prof. A., 180n., 219, 262n., 329
Nicholson, I. M. S., Major, 566, 567
Nidana, an Indian physician, 372
Nigar Khanum, Princess, 192
Nihavend, battle of, 61
al-Nili abu Sahl, 239
Nili Muhammad, a physician, 312
Nisibis, 38, 45, 46
Nizam-ul-Mulk, a *wazir*, 51n., 211, 212, 230, 232, 317
Nizami 'Aruzi Samarqandi, a poet, viin., 111, 124, 125n., 188, 195, 204, 216, 360
Nobakht, an astrologist, 366
Noeldeke, 52, 53
al-No'man, a general, 60, 61
Nonus Almansuris, see *Liber Nonus ad Almansorem*
Note-book of the Oculists of Jesu Haly, tr. by Casey Wood, see *Tazkirat-ul-Kahhalin*
Nuh b. Mansur Samani, 186, 192, 193
Nuh b. Nasr Samani, 102
Nur-ul-'Ayun, of Zarrindast, 142
Nur-ul-Din, physician to Shah Tahmasp, 358
Nur-Ullah 'Ala'-ul-Din, a pharmacologist, 365, 381
Nurses employed in hospitals, 132, 170, 173
Nurshirvan (also called Anusharwan), 38, 40, 49, 50, 51, 53, 54, 55, 58, 66, 98
abu Nuwas, a poet, 127
Nuzhat-ul-Ashab fi M'ashurat-il-Ahabab, of Samu'l b. Yahya, 295

Nuzhat-ul-Qulub, of al-Qazvini, 49n., 65, 217, 232n., 290n., 316, 322

Occult Philosophy, of Cornelius Agrippa, 209
Ocean of Story, of Penzer, 32, 117n.
Ochus, 25
Oderic, 34
Oddling, Dr, 524, 532
Oelschlager, Adam, *see* Olearius
Ogotay, 302
Olearius, 383, 400
Oliphant, Dr Patrick, 411, 412
Omar Khayyam, a poet, 212
On Love as a Disease, of 'Ubayd-Ullah, 213, 214
On the Nature of Properties and the Utility of Organs of Animals, of 'Ubayd-Ullah, 213
On the Nature of Vision, of Rhazes, 136
On the Right Way to preserve Descent, of 'Ubayd-Ullah, 213
Opera d' Ibnull-Muqaffa, of Gabrieli, 52
Opera Parva Abubetri, 202
Opticae Thesaurus, of Alhazen, 136
Osler, Sir William, 65, 192, 198
Ouseley, Sir Gore, 445
Outrey, a physician, 433; George, his son, 440

Pack, Mr, 408
Paediatrics, 202, 296
Palmer, Mr Francis, 431
Pandects of Ahrun, by Masarjoyah, 99
Pantegni, 330; see also *Liber Regius*
Paper, discovery of method of manufacture, 102
Paris, 213, 323
Parker, Dr John, 399, 426, 427, 428
Parysatis, daughter of Artaxerxes I, 25
Pasley, Capt., 442–4
Pasmore, Col., 469
Pasteur, Prof. Louis, 437
Paul, Patriarch of Shiraz, 235, 245
Peirson, Mr, 418
Penzer, N. M., 32, 117
de Perceval, Caussin, 62
Percival, Mr William, 426
Perishapur, 42
Perron, M., 63
Pers. Weisheit in griech. Gewande Zeits. f. Indol. u. Iran, 21n.
Perzoes (Burzuya or Buzurjmihr), 40, 52, 53, 54, 340, 372
Peter of Abano, 94
Petersburgh, St, 455, 529, 538
Petit, Mr John, 399
Pfander, Dr, 533
Pharmacopoeia Persica, of Fr. Angelus, 366, 399
Philippus of Acarnania, 28
Phlebotomists and Phlebotomy, 247, 248, 269, 299–301
Phocas, 55, 56
Physicians, fees charged by, 17, 265–73
Physiognomie Arabe, of Mourad, 157
Pir Muhammad, grandson of Tamerlane, 325, 332
Plato, 20, 49, 52, 136, 594
Pliny, 322
'Pliny of the Arabs', 322
Plutarch, 29
Pocock, 307
Poison-maiden, 30, 31
Polak, Dr, 501, 502, 512
Polybus, disciple of Hippocrates, 2
Potin's aspirator, 288
Prosper O.C., Rev. Fr., 394
Ptolemy, one of Alexander's generals, 29
Public health, in Zoroastrian times, 9–12; in Islamic times, 275–8

Qabiha, wife of al-Mutawakkil, 119
Qabus b. Washmgir, 188, 189
al-Qadir, 25th 'Abbasid caliph, 210
al-Qahir b' Illah, 19th 'Abbasid caliph, 210
al-Qa'im, 26th 'Abbasid caliph, 210, 224
Qalandari, Mirza Hadi, 415
al-Qamari, Hasan b. Nuh, 185
Qanunchi, of Muhammad Husayn, 416; commentated on by 'Abd-ul-Majid, 375
Ibn Qarabah, a citizen, 131
Qasim, a translator, 503
Abu ul-Qasim, a physician, 520
Abu ul-Qasim al-'Iraqi, an alchemist, 284
Qawam-ul-Saltana, a prime minister, 552, 553
Qawanin, of Avicenna, 194
Qawanin-ul-'Ilaj, of Muhammad b. 'Ala'-ul-Din, 355
Qazi 'Ali Baghdadi, a clerk, 379
Qazi b. Kashif-ul-Din Hamavi Yezdi, 283, 365, 381
Qazi Sa'id, 198
Qazvin, 288, 304, 356, 358, 359, 382, 384, 390, 396, 416, 462, 470, 495, 497, 499, 551
al-Qazvini, Hamd-Ullah al-Mustaufi, 49, 65, 217, 232, 290, 315, 316, 322, 323
al-Qazvini, abu Yahya Zakariyya, 43, 65, 322, 323

al-Qifti, viin., 48, 55n., 105n., 124, 125, 126n., 140, 141, 156, 158, 161, 184n., 192, 197, 240, 307, 361n.
Quacks Academy, 209
Qubilay, a Mongol, 302
Quellenkunde der Persischen Medizin, of Fonahn, viin., 216, 347, 416n.; *see also* Fonahn
Questions, of Hunayn, 239, 269
Ibn ul-Quff, a surgeon, 278
Quince, Dr Thomas, 395, 396
Qum, a city, 304, 387, 390, 426, 470, 501
Qur'an, 2, 62, 63, 65, 106, 147, 172, 185, 191, 206, 262, 263, 264, 311, 339
abu Quraysh 'Isa al-Saydalani, 77, 78, 79, 120, 255, 256, 270
Qurrat-ul-Malik, a Sanscrit work, 320
Qutb-ul-Din Khwarazmshah, 215, 219
Qutb-ul-Din al-Misri, 303
Qutb-ul-Din Qaimaz, 226, 227
Qutb-ul-Din Shirazi, a physician, 307, 308, 309

Rabelais, 209
Rainier, Capt., 524
Shaykhah Rajihab, a female practitioner, 253
Ibn abi Ramsia, 65
al-Raqqa, 149
Rashid-ul-Din Fazl Ullah, 312–16, 324, 349, 364
Rashid-ul-Din abu Sa'id, 164
al-Rauzat-ul-'Attar fi Nazhat-il-Khatir, 296
al-Rauzat-ul-Tibb, of 'Ubayd-Ullah, 213
Ray, a city, 61, 139, 189, 190, 197, 198, 304, 353, 372
Raymond, an archbishop, 206
al-Razi, 20th 'Abbasid Caliph, 147, 149
al-Razi, abu Bakr, *see* Rhazes
al-Razi, Fakhr-ul-Din, *see* Fakhr-ul-Din abu Razi, 86
Razi-ul-Din al-Rahabi, a physician, 237
Reilly, Dr Michael, 430, 431
Relation of Some Yeares Travaile, of Herbert, 292
Resht, 417
Resike, 62
Rev-Ardeshir, 39
Revue Médicale de la Suisse Romande, 592
Rhages, *see* Ray
Rhazes (al-Razi), 53, 70, 75, 93, 94, 110, 111, 116, 125, 136, 138, 153, 159, 169, 181, 185, 196, 197, 198, 199, 201–5, 207, 208, 216, 235, 237–40, 246, 249, 251, 253, 254, 267, 271, 274, 278, 279, 280, 298, 307, 342, 353, 355, 370, 372, 404, 407, 536, 595
Rhyns, William, 394
Riach, Dr, 450, 464, 474, 475, 476, 478, 480, 481, 485, 489, 490, 494
Rice, Sir Cecil Spring, 527
Richard Cœur de Lion, 225
Risala-i-Chub Chini Khurdan, of 'Imad-ul-Din, 365
Risala-i-Joharıyya, of Baba Shirazi, 511
Risala-i-Tibb-i-Aspan, of Zayn-ul-Amin, 320
Rise and Fall of the Abbasid Caliphate, of Muir, 210n.
Riyaz-ul-Advıyah, of Yusuf b. Muhammad b. Yusuf, 378
Riza Quli Mirza, son of Nadir Shah, 414
Riza Mirza Sayyid, 520
Riza Shah, previously Riza Khan and Sirdar Sipah, 510, 551, 552, 554, 556, 562, 567
Rizai, Mirza, a physician, 502, 520
Ibn Rizvan, *see* 'Ali b. Rizvan
Robson, Dr James, 431, 432
Rome, 366, 393, 395
Romieu, M., 440
Rose, Dr John, 412
Ross, Dr, 431
Roxana, 25
Royal Asiatic Society of Bengal, 381
Royal Asiatic Society of London, viii; *Journal*, 194, 202, 220n.
Royal College of Physicians, 157, 586, 587, 588
Royal Society of Medicine, Proceedings of, 284n.
Rudaba, 283
al-Ruffa, Sari, a poet, 134
Rukn-ul-Din Mas'ud, physician to Shah Tahmasp, 357, 358
Rukn-ul-Din, Sultan of Egypt, 320
Rukn-ul-Doula, father of 'Azud-ul-Doula, 153, 199
Rukn-ul-Doula, governor of Qazvin, 470, 471
al-Rumi, a poet, 1n., 180, 181, 182, 249, 275n., 282, 339n., 351, 352
Russell, Dr, 412
Rustam, a hero, 293

al-Sababi, a commentator, 106
Sabas, a village, 43
Sabit, a physician, 224, 225
Sabit b. Ibrahim, physician to 'Azud-ul-Doula, 150, 151, 159
Sabit b. Kashkaraya, 128
Sabit b. Qura (Sabit I), 2, 74, 102, 105, 123–8, 182, 239, 282, 353

Sabit b. Sinan (Sabit II), 125, 133, 134
Sabuktagin, 153, 154
Sabur b. Sahl al-Kusaj, 50, 92, 275
Sad Bab, of Abu Sahl al-Masihi, 185, 216, 239
Sa'd-ul-Din b. ul-Zahir, 320
Sa'd-ul-Doula, a patient, 265
Sa'd-ul-Doula, physician and *wazir*, 308, 309, 310
Sa'di, a poet, 54, 65, 239n., 333, 375, 376n.
Sadid al-Kazaruni, a commentator, 375
al-Sadid abu ul-Wafa al-Murakhkhim, a physician, 174
al-Sadidi, a commentary on the *Mujiz-ul-Qanun*, of Sadid Kazaruni, 375
Ibn abi Sadiq, 211, 214, 215
Sadr A'azam, 507, 508
Ibn Sadr-ul-Din, an anatomist, 331
Sadri al-Usquf, 103
al-Saffah, 1st 'Abbasid Caliph, 69, 81
Safi Shah, son of Shah 'Abbas I, 385
Safi Shah, son of Shah 'Abbas II, afterwards called Sulayman Shah, 368, 386, 387, 388, 389, 407
Safiy-ul-Din, a saint, 349
Ibn Safiya abu Ghalib b. Safiya, 225, 226, 227
al-Sahib b. Albad, 133
Sahl b. Sabur al-Kusaj, 92, 93, 167
Abu Sahl Sa'id b. 'Abd-ul-Aziz, 239
Abu Sahl abu Mansur al-Qamari, 236
Abu Sahl 'Isa al-Masihi, 185, 187
Shaykh Abu Sa'id, 192
Sa'id b. Bishr b. 'Abdus, 222
Sa'id b. Hibat Ullah, 167, 223
Abu Sa'id Kukuburi, 172
Abu Sa'id, Mongol Il-Khan, 324, 364
Abu Sa'id 'Ubayd-Ullah b. Jibra'il, *see* 'Ubayd-Ullah
Abu Sa'id, son of Uljaytu, 314, 315
Abu Sa'id Yamani, 241, 269
Sain, a Persian general, 56
Salah, a physician, 96
Salah-ul-Din, a biographer, 138
Salma, a translator, 101
Salmawaih b. Bunan, 91, 107, 328
Abu ul-Salt, 161, 163
Samarqand, 96, 102
Samsam-ul-Doula, 384
Samsam-ul-Saltana, 543
Sanjahl, an Indian translator, 372
Saporta, a professor at Montpellier, 208
Abu Saqar al-Kavdani, 182
Ibn Sarabiyun, Da'ud, 77, 79
Ibn Sarabiyun, Yahya, *see* Ibn Serapion
al-Sarakhsi, 'Abd-ul-Rahman, 123, 219
al-Sarakhsi, Ahmad b. ul-Tabib, 123
Sarat, 101
Sarton, 117n.
Satara, mother of Avicenna, 184
Saul, 35
Savage, Mr, 412, 418
Sayf-ul-Atibba, *see* Seif-ul-Atibba
Sayf-ul-Doula b. Hamdan, 163
Sayf-ul-Doula, governor of Ispahan, 470
Sayf-ul-Maluk, son of Zill-ul-Sultan, 499
Sayyid Isma'il, *see* al-Jurjani
Sayyid Riza, a physician, 520
Sayyid Ziya'-ul-Din, 551, 552, 562
Sayyida, widow of Majd-ul-Doula, 189, 190
Sbath, Rev. Fr. Paul, 213n.
Schlimmer, Dr, 367, 369, 371, 375, 502, 512
Schneider, Dr, 524, 526, 530, 531, 564
Schnese, Dr, 417
Scott, Dr Joseph, 546, 547, 554, 555, 557
Scott, Sir Walter, 225
Secreta Secretorum, 116, 117
Seif-ul-Atibba, Dr, 551
Seleucia, 42, 43, 81
Seleucus Nicator, 41, 45
Septuagint, 111
Ibn Serapion (Yahya b. Sarabi), 53, 207
Sergius, Saint, 55, 86
Sergius of Ra's-ul-'Ayn, 86, 98, 110
Shabib al-Khariji, a general, 341
Shah Abdul Azim, a village, 482
Shah Jahan, emperor of Delhi, 373
Shah Rukh, 325, 348, 349, 391, 392, 438
Shah Shams-ul-Din, 353
Shah Shuja', 363, 364
Shah Sulayman, 270, 293, 297, 368
Shahabad, 50
Shahnama, of Firdausi, 2, 3n., 30n., 47n., 283, 316; *see also* Firdausi
Shams-ul-Doula b. Sayyida, 189
Shapur I, 38, 39, 40, 47
Shapur II, 41, 42, 45, 48
Sharaf-ul-Din, a *wazir*, 226
Sharaf-ul-Din, Hasan Shirazi, a physician, 356
Sharaf-ul-Din, Zakki, *see* al-Bushkani
Sharbat-khana-i-Khayriah-i-Padishahi (Royal Charitable Dispensary), 359
Sharh-ul-Asbab, of Nafis b. 'Iwaz, 304
Sharh-ul-Kuliyat min Kitab-il-Qanun, of Muwaffaq-ul-Din, 309
Sharh-ul-Magna, of Sadid Kazaruni, 375
Sharh-i-Muyiz-il-Qanun, of Nafis b. 'Iwaz, 336
al-Sharisi, a writer, 259
Sherley, Mr Robert, 393

Shiel, Col., 486, 496
al-Shifa, of Avicenna, 190–4
Shirin, wife of Nurshirvan, 55
Shirshu' b. Qutrub, a patron, 103
Shiraz, 157, 324, 366, 367, 390, 392, 397, 399, 400, 401, 415, 430, 437, 438, 441, 443, 447, 448, 449, 450, 458, 473, 497, 507, 515, 538
Short, Dr James, 433, 435, 436
Shuharat, a poet and physician, 415
Shustar, 44, 61, 163, 352
Sieben Bücher Anatomie des Galen, of Dr Max Simon, 326
Simeon of Antioch, 53
Simon, Dr Max, 326
Simon, Rev. Fr. Paul, 383
Simplicia, of Masawayh-al-Marindi, 93
Ibn Sina, *see* Avicenna
Sinan b. Sabit b. Qura, 127, 128, 130–3, 148, 149, 161, 163, 240, 241, 317, 416
Sinan, physician to 'Azud-ul-Doula, 128, 159
Singara, battle of, 41
Sixteen Treatises, The, of Galen, 239
Siyasatnama, of Nizam-ul-Mulk, 51n., 317n.
Small, Dr James, 432, 433
Small-pox, first appearance in Arabia, 62
Smith, Mr, 412
Sofistai or The Sophists, 54
Soghdanus, 25
Soubiran, Dr, 184n., 196
Speer, Robert E., 533n.
Steele, Mr Richard, 393
Stephen of Edessa, 51
Stephenson, Lt.-Col. J., 322
Stewart, Major, 459, 461
Stoddart, Capt., 474, 475, 482
Strachan, Dr George, 393, 394, 395
Stuart, Dr Emmelina, 534
Stump, Dr, 537
Sudhoff, Dr Karl, 94, 328, 345, 347
Sufficiency, of Ibn Manduya, 163
Sufficientia, of Avicenna, 207
al-Suhayli, Ahmad b. Muhammad, 187
Sulayman Shah, *see* Safi Shah
Sulayman Tuluni, 327
Sulayman, a merchant, 314
Sultan Ahmad Khan, 323
Sultan 'Ala'-ul-Din Khwarazmshah, 215
Sultan 'Ali, grandson of Shaykh Junayd, 350
Sultan Husayn, the last of the Timurids, 349, 351
Sultan Husayn Mirza, 353
Sultan Husayn Shah, 389, 390
Sultan Mas'ud Seljuq, 225
Sultan Muhammad 'Azamshah, emperor of Delhi, 201
Surat, 393, 394, 395, 397, 399, 401
Surgeons and Surgery, 162, 236, 245, 269, 278–81, 285–94
Sus or Susa, *see* Shustar
al-Suyuti, Jalal-ul-Din, 63, 296
Sykes, Sir Percy, 383, 543
Syphilis:
  first appearance in Persia, 375–81
  death of Alexander attributed to, 32
  its prevalence, 365, 367, 382, 404
Swally, 396
Syrian Anatomy, Pathology and Therapeutics of, of Prof. Budge, 112
System of Medicine, of Hunayn, 194; of Theodorus, 48

al-Tabari, Ahmad b. Muhammad, a writer, 142
al-Tabari, 'Ali b. Rabban, a physician, 140, 340, 372
al-Tabari, 'Ali b. Sahl, a physician, 197
al-Tabari, Muhammad Jarir, an historian, 6, 253, 297
Tabib Mu'mana, Muhammad Mu'man Husayni, 368
Tabriz, 310, 311, 312, 315, 348, 350, 351, 382, 385, 390, 391, 445, 451, 452, 453, 456, 457, 459, 460, 462, 464, 467, 469, 470, 472, 477, 478, 479, 480, 486, 489, 490, 497, 499, 510, 540
Tacuini Aegritudinem, of Ibn Jazla, 206
Tacuini Sanitatis Eluchasem, see *Taqwin-ul-Sahhat* of Ibn Butlan
Tahir, a general, 40, 97
Ibn Tahir, abu Hasan, a druggist, 256
Tahmasp Mirza, son of Shah Sultan Husayn, 390
Tahmasp Quli Afshar, *see* Nadir Shah
Tahmasp Shah, 348, 356, 357, 358, 359, 373, 375, 382, 414
al-Tai', 24th 'Abbasid Caliph, 210
Abu ul-Taiyyih Muhammad b. Ishaq, 259
Taj-ul-Doula, wife of Fath 'Ali Shah, 455, 456
Taj-ul-Doula Tutush, 190, 212
Takudar Oghlu, 307, 309
Talisman, The, of Sir Walter Scott, 225
Tamerlane, 324, 325, 348, 349, 442
Tansukhnama-i-Ilkhani fi 'Ilm-ul-Madaniyat, of Muhammad al-Tusi, 318
Taqi Khan, later Amir Nizam, 500, 501, 503, 507

Taqsim-ul-'Ilal, of Rhazes, 202
Taqwim-ul-Abdan, of Ibn Jazla, 222, 223
Taqwim-ul-Sabhat, of Ibn Butlan, 222
'Mirza Tar', a physician, 422
Tarfat b. ul-'Abd, a poet, 63
Tarikh-ul-Hukama, *see* al-Qifti
Tarikh-ul-Tawarikh, 96n.
Tashrih bi al-Taswir, of Mansur b. Faqih Ilyas, 332–9
al-Tasyufatai, 54
Tavernier, John Baptista, 268, 293n.
Tawaddud, a slave girl, 331, 332, 333, 340
al-Tayfuri, 'Abd-Ullah, physician to al-Hadi Caliph, 77, 79, 90, 91, 119, 120
al-Tayfuri, Isra'il b. Zakariyya, physician to al-Mutawakkil Caliph, 108, 120, 121, 122, 270
al-Tayfuri, Zakariyya b. 'Abd-Ullah, 120, 121
al-Tayyib, an ophthalmologist, 140
Tayyibi, Dr Sayyid Abdul Ali Khan, 571, 572, 575
Tazkirat-ul-Hazir wa Zad-ul-Musafir, of 'Ubayd-Ullah, 213
Tazkirat-ul-Kahhalin, of 'Ali b. 'Isa, 140, 141, 142, 282
Teheran, 34, 359, 392, 437, 439, 440, 441, 442, 443, 445, 447, 448, 449, 450, 451, 453, 455, 456, 458, 459, 460, 462, 466, 468, 470, 471, 472, 474, 475, 476, 477, 478, 479, 480, 482, 483, 484, 485, 486, 488, 489, 490, 494, 495, 496, 497, 498, 499, 504, 506, 507, 509, 510, 511, 513, 514, 515, 516, 519, 520, 521, 530, 531, 535, 538, 539, 540, 542, 551, 567, 570, 572
Ten Treatises of the Eye, of Hunayn, 139, 246, 345
Terminologie, of Schlimmer, 367, 369, 502
Thaddeus O.C., Bishop John, 478
Theodorus, a bishop, 103
Theodorus, a physician, 48
Theodosius, a physician, 48
Thesaurus, of al-Jurjani, 50n., 180n., 216–18, 239, 240, 294, 332, 354, 356, 366, 367, 373; of Sabit b. Qura, 125–7, 239
Thessalus, son of Hippocrates, 2
Thiyazuq, a physician, 68
Tholozan, Dr, 511, 513, 517, 518, 502, 564
Thraetoma, 6
Tibb-i-Akbari, of Muhammad Akbar Arzani, 304, 374
Tibb-ul-'Ayn, of Jibra'il b. 'Ubayd-Ullah, 142
Tibb-i-Dara Shikubi, of 'Ayn-ul-Mulk, 373, 374
Tibb-ul-Nabbi, 6n., 63, 167, 374
Tibb-i-Shifa'i, of Muzaffar b. Muhammad al-Shifa'i, 366
Tibb-i-Yusufi, of Yusuf b. Muhammad, 367, 379
Ibn ul-Tilmiz, physician to al-Mustazi Caliph, 227, 241, 242, 243, 258
Ibn ul-Tilmiz, abu ul-Faraj Yahya, 165
Ibn ul-Tilmiz, Amin-ul-Doula, 162, 165–8, 238, 239, 275
Timraz, a general, 182
Timur-i-Lang, *see* Tamerlane
Tiridates, 38
Tomlin, Dr, 409, 410, 411
Toulouse, 366
Tractatus de Oculis, of Canamusali, 142; of Jesu Haly, 141
Trafalgar, battle of, 442
Travels in Persia, of Chardin, 275n.; of Tavernier, 293n.
Treasury, The, of al-Jurjani, 50n., 180n., 216–18, 239, 240, 294, 332, 354, 356, 366, 367, 373; of Sabit b. Qura, 125–7, 239
Tribunus, 51
Trois Traités d'Anatomie arabes, of Koning, 326
Tughril Beg, 210, 211, 224
Tuhfat-ul-Hukama, of Ibn Ilyas, 313
Tuhfat-i-Kan-i-'Ilaj, 321
Tuhfat-ul-Mu'manin, 101, 284, 368
Tuhfat-ul-Sa'diyya, of Qutub-ul-Din, 308, 309
Tuhfat-ul-Salatin, of al-Ansari, 364
Tully, a general, 303
Tuqjay, a slave, 310
Turbat-i-Haydari, 528, 529
Tus, 96, 305
al-Tusi, Muhammad b. Husayn, 318
al-Tusi, Nasr-ul-Din Muhaqqiq, *see* Nasr-ul-Din
Tuzun, a general, 149, 150, 152
Tytler, Dr John, 375

'Ubayd-Ullah b. Jibra'il I, physician to al-Muttaqi ('Ubayd-Ullah I), 158, 159
'Ubayd-Ullah b. Jibra'il II, abu Sa'id ('Ubayd-Ullah II), 161, 212–14
Ibn ul-Ukhuwwa, 244n., 264; *see also* Ma'alim al-Qurba
Uljaytu, 314, 315, 324
Ulugh Beg, 304, 348, 349
'Umar, 2nd caliph, 59, 60, 61
'Umar b. 'Abd-ul-Aziz, Umayyad Caliph, 99

'Umar al-Khayyam (Omar Khayyam), 212
'Umar Shaykh, ruler of Farghana, 373
Uranias, a physician, 51
Urganj, 302
Urmuzd, *see* Hormisdas
Urumiah, 34
Usama ibn Munqiz, 224
Ibn abi Usaybi'a, vi, 1n., 2, 48n., 50n., 65n., 66n., 68n., 77, 78n., 79n., 83n., 86n., 87n., 89n., 96n., 98, 101n., 102n., 103n., 104n., 112n., 115n., 119n., 121n., 124n., 133n., 134n., 139n., 140, 141, 149n., 155n., 156n., 158n., 161n., 162n., 163n., 164, 165n., 168n., 175, 177n., 178n., 182n., 183, 184n., 185n., 192n., 196, 213n., 214, 215, 216n., 219n., 220, 221n., 222n., 227n., 237n., 239n., 240n., 257n., 258n., 260n., 267n., 268n., 269n., 271n., 317n., 328, 332n., 360n., 372n.
Abu Usman b. Ghalib, 123
Abu Usman Sa'id b. Ya'qub, 132
al-Utrush, al-Hasan b. 'Ali, 144
'Uyun-ul-Haqa'iq, of al-'Iraqi, 284
'Uyun-ul-Iaba'fi Tabaqat-il-Atibba, *see* Ibn abi Usaybi'a
Uzun Hasan, 349, 350, 351

Valerian, emperor of Rome, 38, 47
Varahran, *see* Bahram
Vaume, Dr, 525
de Vaux, Baron Carra, 194
Veh-az-Andev Shapur, *see* Jundi Shapur
Vendidad, 5, 15
Venice, 157, 356, 406, 525
de Vercheville, Simon, also known as Mirza Muhammad Reza, 426, 427
Vie Medicale, La, 191n.
Vigoreux, M., 412
Vincent O.C., Rev. Fr., 395
Vossugh-ul-Douleh, 542, 544, 545, 562
Voyage, of Ives, 362n., 427
Voyages and Travels, of Cook, 273n., 291n., 415n.

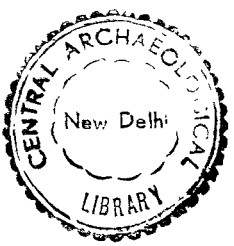
Wahid-ul-Zaman, *see* Abu ul-Barkat
Wall, Dr R. M., 521
Waq'at-ul-Atibba, of Ibn Butlan, 221
Ward, Mr, 397
all-Warraq, a poet, 295
Ibn Wasif, an ophthalmologist, 134, 269
al-Wasiq, 9th 'Abbasid Caliph, 71, 89, 91, 107, 119
Wellesley, Lord, 440
Went, Mr Robert, 425, 426
Williams, Dr, 432
Williams, I. M. S., Capt., 530
Willis, Dr C. J., 290
Willis, Dr Thomas, 355
Willock, Mr, 445, 450, 456
Wilson, Mr, 425
Wisdom of the Indians, tr. by Simon of Antioch, 53
Witelo the Pole, 136
Women doctors, Rhazes on, 253
Wood, Mr Francis, 425
Woollatt, Dr, 547
Wustenfeld, vin.

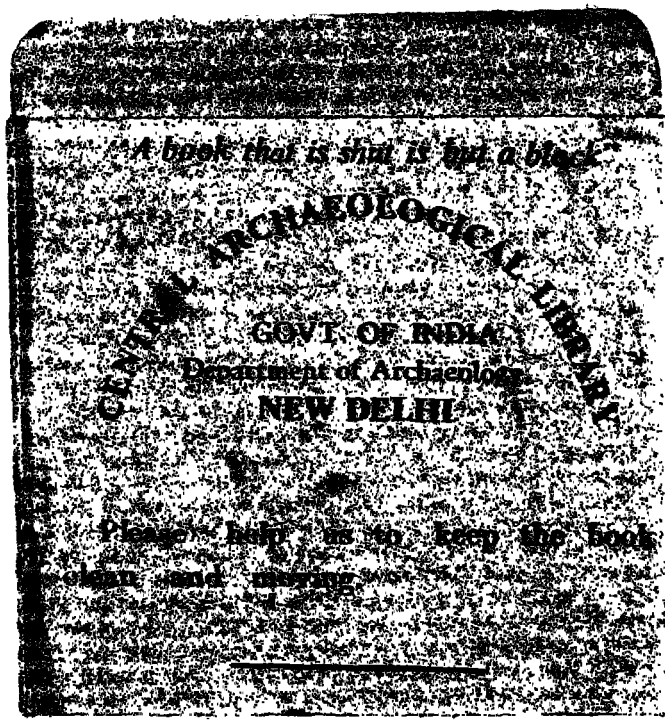
Xenophon, 25, 26
Xerxes, son of Darius the Great, 24

Yadgar-i-Tibb, of al-Jurjani, 218
al-Yahudi, *see* Masarjoyah
Yahya b. Khalid, 78, 79, 81, 82, 83, 101, 132
Yahya b. Sarabi, *see* Ibn Serapion
Ya'qub, a eunuch, 453, 454
abu Ya'qub, Ahwazi, 161, 163
Ya'qub b. Lays, a general, 49
Ya'qub Muhammad b. ul-Khalifa, 320
Ya'qub, son of Uzun Hasan, 350
Yaqut, the geographer, 39n., 49, 160, 201, 212n., 303
Yar 'Ali, physician to Shah Tahmasp, 359
Yasht, 5, 14
Yasna, 5
'Year of the Girls', or *Kizlarun Ili*, 390
Yennish, Dr, 476
Yezd, 424, 439, 458, 542
Yezdegird, 60, 61, 263
Yezd-i-Khwast, 450
Young, Dr Constantine, 396
Yuhanna, a physician, 55
Yuhanna b. Masawayh, *see* Mesue Senior
Yuhanna b. Sarabi, 151
abu Yusuf, a judge, 256
Yusuf b. Muhammad b. Yusuf, 378
Yusuf al-Sagafi, 67
Yusuf al-Sahir al-Qass, 128
Yusuf al-Wasiti, physician to al-Muqtadir, 133
Yusuf b. Yahya, 132

Al-Zahir, 35th 'Abbasid Caliph, 230
Al-Zahir-ul-Din Muhammad, *see* Babur
Al-Zahir, Rukn-ul-Din Baybars, 320
Abu Zakar, a poet, 83
Al-Zakhira, of Sabit b. Qurra; see *The Treasury*, of Sabit

Al-Zakhira-i-Kamila, 279, 283, 284
Al-Zakhira-i-Khwarazmshah, of al-Jurjani; see *Thesaurus*, of al-Jurjani
Al-Zamakhshari, 291
Zarathustra, *see* Zoroaster
Zarrin Dast, an ophthalmologist, 112, 142
Abu Zayd, *see* Hunayn
Zayn-ul-'Abidin, Hajji, 478
Zayn-ul-'Abidin, Sultan of Cashmir, 347
Zayn-ul-Amin, a writer, 320
Zayn-ul-Din the physician, *see* al-Jurjani
Zendavesta, 5, 7, 8, 9, 17, 287
Zeno, Emperor of Rome, 46
Zeylessouf-ed-Douleh, viii n.
Zi-ul-Qarnayn, 32; *see also* Alexander the Great
Zill-ul-Sultan, son of Fath 'Ali Shah, 468, 469, 470, 471, 480, 481, 483, 489
Ziya'-ul-Din Mas'ud al-Kazaruni, 308
Ziya'-ul-Din Sayyid, 551, 552, 562
Zohaq, 67
Zoroaster, 5, 6
Zoroastrian Civilization, of Maneckji Dhalla, vii n., 13
Zubdat-ul-Khatun, wife of Harun-ul-Rashid, 311
Zur Quellenkunde der Persischen Medizin, of Fonahn, *see Quellenkunde and* Fonahn




"A book that is shut is but a block"
ARCHAEOLOGICAL LIBRARY
GOVT. OF INDIA
Department of Archaeology
NEW DELHI
Please help us to keep the book
clean and moving.